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AUTHOR	Shisler, Clifford L.
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ABSTRACT

The purpose of this project was the development of comprehensive articulation policies and procedures in three instructional areas common to Greenville Technical College and the Greenville County School System. The areas were Machine Tool Technology/Machine Shop, Engineering Graphics Technology/Drafting, and Industrial Electricity/Electricity. Project activities included development of a competency-based placement program to replace credit and clock-hour requirements, development of counselor skills in implementation of the articulation process, and statements of compatible and sequential behavioral objectives for both secondary and postsecondary instruction. Procedures were developed to allow advanced placement of vocational center students in postsecondary programs, a guidance information form was developed to give feedback to counselors on the progress of articulated students, teacher visitations were encouraged, and a counselor workshop was held. The bulk of this repor consists of Program Articulation Booklets for each of the three instructional program. The Booklets contain student articulation flowcharts, articulation evaluation procedures, transcript evaluation forms, guidance information forms, a list of instructional units, and a detailed list of performance objectives. (JDS)

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Project No.: 498Ah50303 Grant No.: GOO-75-00453

Grantee Organization: Office of Education

Period Covered: July 1, 1975 to September 30, 1976

Project Director: Clifford L. Shisler

OCCUPATIONAL EDUCATION PROGRAM ARTICULATION BETWEEN SECONDARY VOCATIONAL EDUCATION CENTERS AND GREENVILLE TECHNICAL COLLEGE

Final Program Performance Report

2

BEST COPY AVAILABLE

JC 760 492

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ACCOMPLISHMENTS

The overall accomplishment of the Occupational Education Program Articulation Project was the development of comprehensive articulation policies and procedures in three instructional areas common to Greenville Technical College and the Greenville County School System. The areas were Machine Tool Technology-Machine Shop, Engineering Graphics Technology-Drafting, and Industrial Electricity-Electricity.

The attainment of the articulation policies and procedures was facilitated by the following:

Statement of compatible and sequential behavioral objectives by both secondary and post-secondary instructors

Adjustment of classroom evaluation techniques to conform to a competency-based placement program

Broadening of counselor information and skills in the implementation of articulation procedures

The Articulation Project was funded for FY-76 and a three month extension (July 1-September 30, 1976).

The status of the grant activities is explained in the following narrative.

Specific performance objectives were developed for three occupational training programs to replace credit and clock-hour requirements. (Included in the appendices of this report are Program Articulation Booklets which contain copies of performance objectives.) The objectives for the Machine Tool Technology program were specified through the South Carolina State Department of Education Career Cluster Project.

The Career Cluster Project provides objectives, materials, and evaluation methods whose usage is required of the area vocational centers. Vocational center and Greenville TEC instructors specified performance objectives for the Industrial Electricity and Engineering Graphics Technology Programs.

Procedures were adopted to allow advanced placement of vocational center students in post-secondary programs. Following the specification of program objectives, instruments to rate student skills were constructed. The Engineering Graphics Technology program will be using a "Skills Proficiency Rating Form" and the Machine Tool Technology Program will use a "Machine Shop Transcript Evaluation Form." Each of the three programs uses a placement exam. (The Industrial Electricity Program uses a competency exam exclusively to determine advanced placement.)

Effective advanced placement is a bilateral decision. The institution must determine a student's compentencies and prescribe appropriate instruction. The student must also feel confident of his abilities and of the placement. Students have the option of requesting lower program placement. Counselors encourage students, however, not to choose an entry level lower than the one prescribed.

The vocational centers and Greenville TEC programs utilize advisory committees to ensure instructional compatibility with industrial reality. These committees advise on the specification of curricula, selection of equipment and instruction of new methodologies. The committees also make certain that training practices are commensurate to industrial needs.

Project Committees were established early in the project funding period. [illegible] membership was composed of counselors, instructors, program administrators, community representatives, and project staff. The varied membership

provided effective constructive criticism of project activities and commitment to the implementation of the project.

Program Completion Requirements were based on graduation standards established by the State Board for Comprehensive and Technical Education and skills levels demanded by employers. The principal goal of the technical college and the vocational centers is to provide opportunities for individuals to enter the labor market with maximum skills.

An integral function of the articulation process was the regularly scheduled meetings of technical college and vocational school instructors. Instructors were able to discuss common goals and frustrations, share teaching methodologies, and become generally more informed about each other's programs.

MAJOR ACTIVITIES AND EVENTS

The major activities and events of the project are described below.

Tuition Scholarships--Greenville TEC established a tuition scholarship for the three departments of each vocational center involved in the project. The ten scholarships are awarded each June and provide one quarter of free tuition. The scholarships are renewable for one quarter after the student's work is satisfactorily reviewed by his college department faculty.

Guidance Information Form--This form was developed to provide feedback to the College and vocational center counselors on the progress of articulated students.

Teacher Visitations--Instructors in the drafting and engineering graphics programs exchanged teaching positions for one day. This exchange facilitated understanding

of the particular instructional needs of each program level.

Counselor's Workshop--Project Staff coordinated a September workshop for Greenville TEC and vocational center counselors. The workshop allowed counselor to "walk through" the program. Program administrators presented synopses of the articulation process as it applied to their instructional areas. Vocational center instructors were given information and materials to use in advising their students.

PROBLEMS

The project was not completed within the fiscal year for which it was funded. At the end of June, four activities remained unfinished. These activities were the validation of the Industrial Electricity Articulation Test, the completion of the counselor training program, the establishment of a testing center to handle placement exams, and the dissemination of developed materials.

The Industrial Electricity Articulation exam was validated during the late summer. Test items were matched with program objectives and difficulty and discrimination indices calculated for each item. A college testing center has not been established. The lack of these facilities, however, has not inhibited the program. The counselor training workshop and procedures for dissemination of materials are explained elsewhere in this report.

Fall 1976, was the first quarter the articulation process had been used to place students in instructional programs. Although comprehensive evaluation of the program is premature, the program does appear to have the necessary mechanisms to support efficient placement of students. The program needs to become more widely accepted, but this acceptance will be a function of time as the participants become more

comfortable with the process.

PUBLICITY ACTIVITIES

Included in the appendices are four articles which were published by the Greenville TEC "in-house" newspaper, "Tectonics". The "Tectonics" circulation includes all full and part-time instructors and administrators and officials of forty other institutions throughout the country. Two newspaper articles were published to promote the program. These articles, also included in the appendices, were announcements of scholarship awards.

DISSEMINATION ACTIVITIES

Copies of the final report and the program articulation booklets will be sent to the ERIC Clearinghouse for Junior Colleges, the Center for Vocational Education (Ohio State University), the sixteen technical colleges of South Carolina, each vocational center in Greenville County, and the offices of the Greenville County School System. Additional copies will be printed and made available to any institution requesting materials.

PROGRESS ON DATA COLLECTION AND EVALUATION PLANS AND PROCEDURES

The Articulation Project was funded for one year only. The year was spent in the activities of initiating the project. The grant did not provide for a formal evaluation process, however, as the program is fully implemented it will be evaluated through the institutional research and program auditing function of the College.

This evaluation will be examining such program aspects as:

Are the levels of advanced placement appropriate for the student?

What is the effect of the articulation program on retention/attrition rates?

What is the efect of the program on length of study of vocational center graduates?

How do vocational center students compare with non-vocational center students on characteristics as academic success, job placement, and wage levels?

What are the attitudes of vocational center and college faculty toward the articulation process?

Greenville TEC hopes to answer these questions when the program enters its second and third years. The grant funded seed activities only and therefore, the College deems it more valuable to assess the effectiveness of the total program rather than the initiating activities.

OTHER ACTIVITIES

(not applicable)

STAFF EMPLOYMENT AND UTILIZATION

(not applicable)

STAFF DEVELOPMENT

The staff development activities which resulted from the accomplishment of the objectives of this grant are best described with respect to those groups served.

Instructors participated in all of the articulation program meetings and became involved in the design and implementation of the program. Instructors also worked individually with a curriculum specialist as they specified their instructional objectives and correlated test items with those objectives.

Counselors participated in the initial and final articulation program meetings. Efforts were made to increase the level of program information, to inform the counselors of the advantages of advanced placement, and to train them in the evaluation of student skills.

Appendix A

Publicity Activities

(TECTONICS, Vol. I, No. 6 Feb., 1976)

ARTICULATION GRANT ACTIVITIES

Progress is being made on the goals of the articulation grant. The grant is funding activities to improve articulation between Greenville TEC and the vocational education centers.

Recently DAVE TITUS, J. D. WARREN, OLIVER ROGERS, JAMIE McPHERSON, and LARRY SANKEY met with guidance counselors and instructors from the vocational centers and HAROLD KAY of the Greenville County Schools.

The participants agreed on a policy of evaluation for machine technology students. Some of the objectives are based on the Career Cluster Project.

The student placement system will be evaluated four weeks after the quarter begins.

BILL BAILY, RANDY LUCAS, and BRUCE CARDALL are writing objectives in Industrial Electricity for the articulation project.

Engineering Graphics Technology instructors LEE CARAWAY and WALTER RICE have met with the area vocational instructors and are coordinating objective writing in their departments.

ARTICULATION GRANT ACTIVITIES

(TECTONICS, Vol. I, No. 4, Dec., 1975)

Greenville Tec has a grant to promote articulation and instructional agreements between Tec and the vocational high schools in the area. J. D. WARREN, LEE CARAWAY, and SHIRLEY DENTON are coordinating most of the activities from the Tec end. The grant will be of mutual benefit to the schools concerned, but will help students the most. By agreeing on instructional objectives, the faculty at both schools will be able to place students into the Tec program at their skill level. Then students would not have to repeat material they had already learned. The grant is quite comprehensive and requires the involvement of administration, faculty, and counselors from both educational systems.

(TECTONICS, Volume I, No. 7, March 1976)

HAVE AN IDEA?

LES CARAWAY, WALTER RICE, and area vocational instructors are developing objectives for the articulation project. SHIRLEY DENTON is working with BRUCE CARBALL to write industrial electronic objectives.

ARTICULATION GRANT

(TECTONICS, Vol. I No. 8, April 1976)

Greenville Tec faculty continue to meet with instructors from the vocational education centers. On April 6, instructors from the various institutions met to review program and course objectives. A model for the process has been developed. The model depicts student progress through the system.

J. D. Warren has developed a slide-tape set for the Machine Tool Technology program. The program will be used by counselors with prospective students.

Thursday, June 10, 1976 Greenville Piedmont—

10 honored

Ten high school seniors from Greenville, selected as outstanding graduates of industrial and technical programs at area vocational centers, received scholarship awards from Greenville TEC in ceremonies last week.

The students were chosen by center directors and instructors as having "outstanding records in drafting, electricity and machine shop," J.D. Warren, chairman of the industrial careers division at TEC, said.

The awards, consisting of tuition of $99 for the first quarter of attendance at TEC, are renewable for a second quarter, contingent on the students' maintaining satisfactory progress as set by TEC.

Award recipients from Eneree Vocational Center include Jerry Matthews, Greg Stoudenmire and Kermit Shelton; from Foothills, James Liner, Ricky Pruitt and Warren Lewis Anderson; from Donaldson Center, Dennis Finch, Douglas Edward Jackson and Joel Ambrose; and from Wade Hampton High School, David Gaze.

Foothills School Students Get Scholarships

Three seniors at Foothills Vocational Center received scholarship awards from Greenville Technical College in ceremonies this week. J.D. Warren, second from left, chairman of the industrial careers division at Greenville TEC, made the presentations to James Liner, Greer, for drafting; Warren Lewis Anderson, Taylors, for machine shop; and Rickey Pruitt, Greenville, for electricity.

Appendix B

Program Booklets

MACHINE TOOL TECHNOLOGY ARTICULATION

Greenville Technical College GREENVILLE, SOUTH CAROLINA 29606

The work upon which this publication is based was performed pursuant to Grant G00-75-00453 with the U. S. Office of Education, Department of Health, Education, and Welfare.

The project presented or reported herein was performed pursuant to a Grant from the U. S. Office of Education, Department of Health, Education, and Welfare. However, the opinions expressed herein do not necessarily reflect the position or policy of the U. S. Office of Education and no official endorsement by the U. S. Office of Education should be inferred.

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MACHINE TOOL TECHNOLOGY

ARTICULATION GRANT

GREENVILLE TECHNICAL COLLEGE

JUNE, 1976

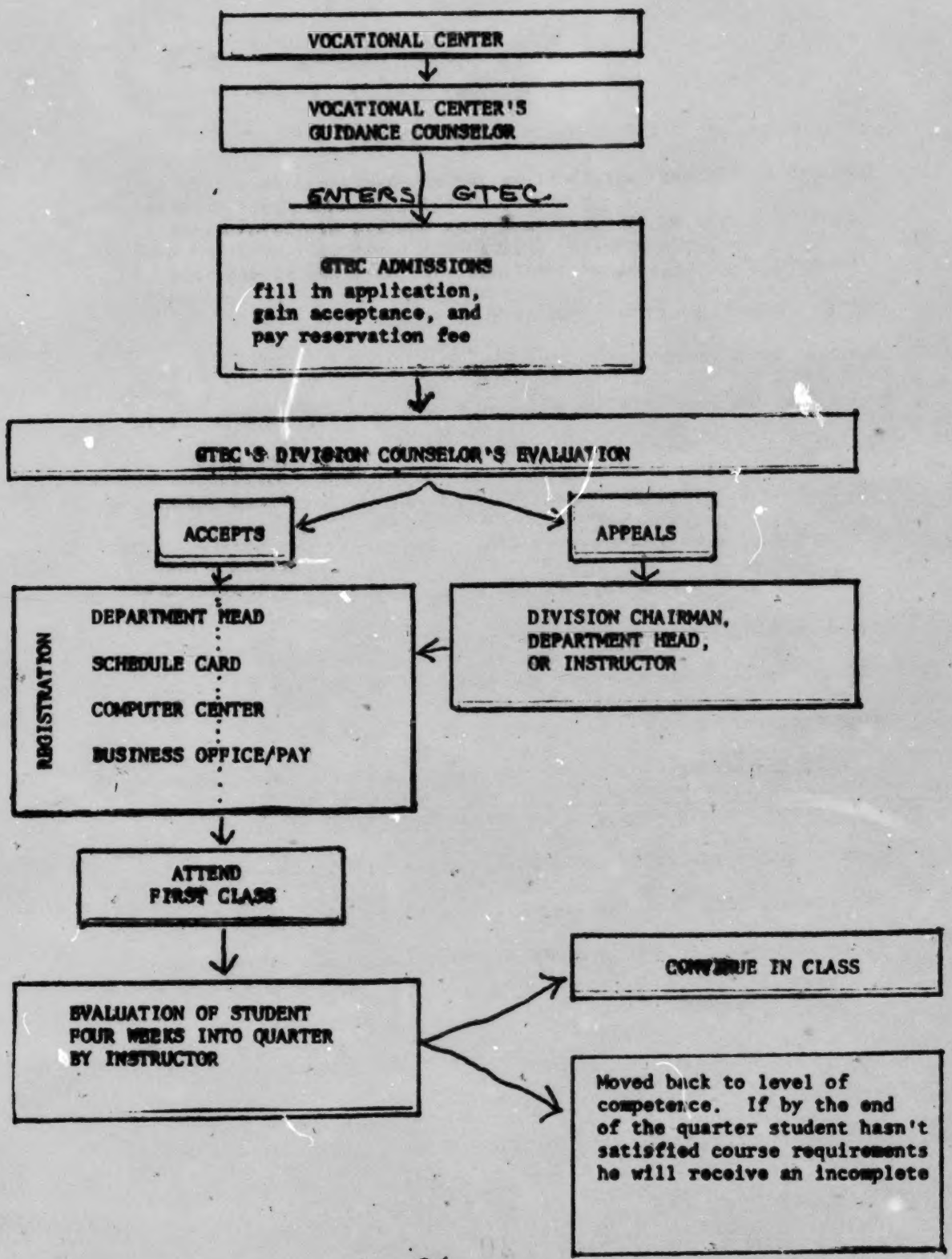
OVERVIEW

Evaluation for articulation into the Machine Tool Technology program at Greenville Technical College begins with the vocational student at his/her vocational center. The student should properly complete a release form in order to allow his/her "machine shop transcript" to be sent to the Industrial Division counselor at GTEC. This "transcript" should have been completed by the machine shop instructor at the center.

The GTEC guidance counselor will evaluate the "transcript" by the Machine Shop Transcript Evaluation Form. This form has a list of Career Cluster Project objectives that have been correlated to the machine shop courses at GTEC. Completion of objectives listed by each project within the four quarters of courses will be considered completion of that project at GTEC. A recommendation is made by the counselor for placement in the Machine Tool Technology program.

If the student disagrees with the counselor's recommendation and requests a higher placement, there is a detailed procedure for reviewing the evaluation by members of the Machine Tool Technology department. (See "Articulation Evaluation Procedure" in this booklet.) If the student requests a lower placement, his/her request will be honored at this time.

Articulating Machine Shop Student Flow Chart


VOCATIONAL CENTER
VOCATIONAL CENTER'S GUIDANCE COUNSELOR
ENTERS GTEC
GTEC ADMISSIONS
fill in application, gain acceptance, and pay reservation fee
GTEC'S DIVISION COUNSELOR'S EVALUATION
ACCEPTS
APPEALS
REGISTRATION
DEPARTMENT HEAD
SCHEDULE CARD
COMPUTER CENTER
BUSINESS OFFICE/PAY
DIVISION CHAIRMAN, DEPARTMENT HEAD, OR INSTRUCTOR
ATTEND FIRST CLASS
EVALUATION OF STUDENT FOUR WEEKS INTO QUARTER BY INSTRUCTOR
CONTINUE IN CLASS
Moved back to level of competence. If by the end of the quarter student hasn't satisfied course requirements he will receive an incomplete

ARTICULATION EVALUATION PROCEDURE

I. Entering Student Is Evaluated by GTEC Division Guidance Counselor with students signature for release

1. Yellow Card (MTT transcript)

II. Student Accepts- - o r - II. Student Appeals -

1. Registers for suggested quarter

1. Division Chairman, Department Head or Instructor will reevaluate student.

2. Deficiencies listed and closer evaluation given - decision reissued with counseling on its rational
   a. appeal denied - go to #3
   b. appeal accepted - go to #4

3. If appeal denied, student allowed to register for suggested MTT course

4. If appeal accepted, time expectancies on student's performance and quality determined and noted to him

5. At the end of 4 weeks the student must meet with the instructor involved to justify continuance based on performance of heretofore listed deficiencies and appropriate progress into the quarter's work

   a. If student's work acceptable, he continues through the quarter.
   b. If not acceptable, student will be moved back to his level of competency. If by the end of the quarter student hasn't satisfied course requirements, he will receive an incomplete.

III. Evaluation of Student, four weeks into quarter, by instructor to verify acceptable level of performance and appropriate initial evaluation

The evaluation instrument development by the South Carolina State Department of Education for the Cluster Project in the ARC funded program for Machine Shop has been included under Machine Tool Technology by courtesy of the South Carolina State Department of Education.

STUDENT'S NAME

LAST _____ FIRST _____ MI _____

HIGH SCHOOL

RELEASE DATE

CONDITION OF RELEASE:

Completed course ( ) Dropped course ( ) Moved ( ) Other _____

MACHINE SHOP

TO BE COMPLETED ONLY BY THE RELEASING INSTRUCTOR

IMPORTANT: BECAUSE THIS RECORD WILL BE REVIEWED BY OTHER INSTRUCTORS IN VOCATIONAL HIGH SCHOOLS, AVC'S, AND TEC CENTERS AS A PRELUDE TO ALLOWING THIS STUDENT CREDIT TOWARDS THE COURSE IN THESE INSTITUTIONS, IT IS IMPERATIVE THAT THIS FORM BE FILLED OUT COMPLETELY. ONLY NO ITEMS. IF THE INFORMATION REQUESTED IS UNKNOWN, SO INDICATE.

COMMENTS.

EVALUATION OF STUDENT BY RELEASING INSTRUCTOR

CIRCLE THE MOST APPROPRIATE RESPONSE (IN YOUR JUDGEMENT) USING THE SCALES PROVIDED. OMIT NO ITEMS. WRITE "UNKNOWN" TO THE SIDE OF THE ITEM IF NECESSARY. BE SURE TO INDICATE THE CLASS SIZE ON THE LAST ITEM.

KNOWLEDGE AND USE OF SAFETY RULES.	Excellent	Good	Acceptable	Poor	Unacceptable
KNOWLEDGE AND USE OF TOOLS.	Excellent	Good	Acceptable	Poor	Unacceptable
ABILITY TO USE HANDS (MANUAL DEXTERITY).	Excellent	Good	Acceptable	Poor	Unacceptable
ABILITY TO ACCOMPLISH MULTIPLE PROBLEM DIAGNOSIS AND REPAIR. REPAIR.	Excellent	Good	Acceptable	Poor	Unacceptable
INTEREST IN THE MACHINIST FIELD.	Excellent	Good	Acceptable	Poor	Unacceptable
ABILITY TO FUNCTION ACADEMICALLY (READING AND MATH PROBLEM SOLVING) IN THE MACHINIST FIELD.	Excellent	Good	Acceptable	Poor	Unacceptable
ANTICIPATED CHANCES OF SUCCESS IF STUDENT TAKES A JOB IN THE MACHINIST FIELD.	Excellent	Good	Acceptable	Poor	
ANTICIPATED DEPTH OF ADDITIONAL TRAINING IN THE MACHINIST FIELD THE STUDENT WILL NEED TO BE SUCCESSFUL IN THE FIELD.	Much More	More	Little More	None	
ABILITY OF STUDENT TO BENEFIT FROM FURTHER TRAINING IN THE MACHINIST FIELD.	Excellent	Good	Acceptable	Poor	Unacceptable
ABILITY OF STUDENT TO HANDLE THE PERFORMANCE OF TASKS AND PROCEDURES RELATING TO THE MACHINIST FIELD.	Excellent	Good	Acceptable	Poor	Unacceptable
ABILITY OF THE STUDENT TO CONCENTRATE OVER A PERIOD OF TIME.	Excellent	Good	Acceptable	Poor	Unacceptable
OVERALL RANKING OF STUDENT AS COMPARED WITH OTHER STUDENTS IN THE SAME COURSE.	Upper 5%	Upper 10%	Upper 25%	Upper 50%	Lower 50%

OF A CLASS OF _____ STUDENTS.

TOTAL TEST SCORES

MSCT: _____ DATE: _____

MSCT: _____ DATE: _____

MSPT: _____ DATE: _____

MSPT: _____ DATE: _____

UNITS OR SECTIONS COMPLETED BY STUDENT

NOTE: PLACE A CHECK IN THE BLOCKS BESIDE THE UNITS OR SECTIONS WHICH WERE AT LEAST 90% COMPLETED BY THE STUDENT. USE THE PROGRESS RECORD ON THE BACK OF THIS FORM TO DETERMINE COMPLETED UNITS. THE UNITS OR SECTIONS CHECKED HERE MUST AGREE WITH THE PROGRESS RECORD ON THE BACK OF THIS FORM.

1.	Shop Math	13A.	Planer
2.	Blueprint Reading	14.	Surface Grinding
3.	Measuring	15.	Tool Post Grinding
4.	Layout	16.	Universal Grinding
5.	Bench Work	17.	Metals - Heat Trt.
6.	Bench-Ped. Grinding	18.	Jig Boring
7.	Drill Press	19.	Oxyacet. Welding
8.	Drill Grinding	20.	Arc Welding
9.	Power Saws	21.	Basic Stdnts.
10.	Engine Lathe	22A.	Engr. Appn.
11.	Milling Mach: Instrs.	22B.	Drill Jig Compnts.
12A.	Milling Mach: Vert.	22C.	Drill Jig Bush.
12B.	Milling Mach: Hrz.	22D.	Mill. Fxty. Compnts.
13.	Shaper	22E.	Mill. Fxty. Bush.

RECORD OF GRADES FOR THIS COURSE

	GRADING PERIOD	GRADE	INSTRUCTOR
Period:	(1ST) (2ND) (3RD) (4TH) OTHER _____	_____	_____
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PERMISSION TO RELEASE THIS RECORD TO OTHER SCHOOLS AND/OR PROSPECTIVE EMPLOYERS FOR THEIR USE IN MY BEHALF IS HEREBY GRANTED.

DATE: _____

SIGNATURE OF STUDENT: _____

SIGNATURE OF PARENT OR GUARDIAN IF STUDENT IS LESS THAN 18 YEARS OLD:

_____

Signature of Releasing Instructor: _____

Date:

_____

SDE 26-051-00
(This form becomes obsolete 6/30/80)

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SHOP MATH

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MILLING MACH. INTRO.

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VERT. MILLING MACH.

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12-A- 4 ☐ ___ DATE: _____
12-A- 5 ☐ ___ DATE: _____
12-A- 6 ☐ ___ DATE: _____
12-A- 7 ☐ ___ DATE: _____
12-A- 8 ☐ ___ DATE: _____
12-A- 9 ☐ ___ DATE: _____
12-A-10 ☐ ___ DATE: _____

HOR. MILLING MACH.

12-B- 1 ☐ ___ DATE: _____
12-B- 2 ☐ ___ DATE: _____
12-B- 3 ☐ ___ DATE: _____
12-B- 4 ☐ ___ DATE: _____
12-B- 5 ☐ ___ DATE: _____
12-B- 6 ☐ ___ DATE: _____
12-B- 7 ☐ ___ DATE: _____
12-B- 8 ☐ ___ DATE: _____

SHAPER

13- 1 ☐ ___ DATE: _____
13- 2 ☐ ___ DATE: _____
13- 3 ☐ ___ DATE: _____
13- 4 ☐ ___ DATE: _____
13- 5 ☐ ___ DATE: _____
13- 6 ☐ ___ DATE: _____
13- 7 ☐ ___ DATE: _____

PLANER

13-A- 1 ☐ ___ DATE: _____

SURFACE GRINDING

14- 1 ☐ ___ DATE: _____
14- 2 ☐ ___ DATE: _____
14- 3 ☐ ___ DATE: _____
14- 4 ☐ ___ DATE: _____
14- 5 ☐ ___ DATE: _____
14- 6 ☐ ___ DATE: _____

TOOLPOST GRINDING

15- 1 ☐ ___ DATE: _____
15- 2 ☐ ___ DATE: _____
15- 3 ☐ ___ DATE: _____
15- 4 ☐ ___ DATE: _____

UNIVRSL. GRINDING

16- 1 ☐ ___ DATE: _____
16- 2 ☐ ___ DATE: _____
16- 3 ☐ ___ DATE: _____

METALS-HEAT TRT.

17- 1 ☐ ___ DATE: _____
17- 2 ☐ ___ DATE: _____
17- 3 ☐ ___ DATE: _____
17- 4 ☐ ___ DATE: _____
17- 5 ☐ ___ DATE: _____
17- 6 ☐ ___ DATE: _____
17- 7 ☐ ___ DATE: _____
17- 8 ☐ ___ DATE: _____
17- 9 ☐ ___ DATE: _____
17-10 ☐ ___ DATE: _____
17-11 ☐ ___ DATE: _____
17-12 ☐ ___ DATE: _____
17-13 ☐ ___ DATE: _____
17-14 ☐ ___ DATE: _____
17-15 ☐ ___ DATE: _____

JIG BORING

18- 1 ☐ ___ DATE: _____
18- 2 ☐ ___ DATE: _____
18- 3 ☐ ___ DATE: _____
18- 4 ☐ ___ DATE: _____
18- 5 ☐ ___ DATE: _____
18- 6 ☐ ___ DATE: _____
18- 7 ☐ ___ DATE: _____
18- 8 ☐ ___ DATE: _____
18- 9 ☐ ___ DATE: _____
18-10 ☐ ___ DATE: _____

OXACT. WELDING

19- 1 ☐ ___ DATE: _____
19- 2 ☐ ___ DATE: _____
19- 3 ☐ ___ DATE: _____
19- 4 ☐ ___ DATE: _____
19- 5 ☐ ___ DATE: _____
19- 6 ☐ ___ DATE: _____
19- 7 ☐ ___ DATE: _____
19- 8 ☐ ___ DATE: _____
19- 9 ☐ ___ DATE: _____
19-10 ☐ ___ DATE: _____

ARC WELDING

20- 1 ☐ ___ DATE: _____
20- 2 ☐ ___ DATE: _____

BASIC BIR HELPS.

21- 1 ☐ ___ DATE: _____
21- 2 ☐ ___ DATE: _____
21- 3 ☐ ___ DATE: _____
21- 4 ☐ ___ DATE: _____
21- 5 ☐ ___ DATE: _____
21- 6 ☐ ___ DATE: _____
21- 7 ☐ ___ DATE: _____
21- 8 ☐ ___ DATE: _____
21- 9 ☐ ___ DATE: _____
21-10 ☐ ___ DATE: _____
21-11 ☐ ___ DATE: _____
21-12 ☐ ___ DATE: _____
21-13 ☐ ___ DATE: _____
21-14 ☐ ___ DATE: _____
21-15 ☐ ___ DATE: _____
21-16 ☐ ___ DATE: _____
21-17 ☐ ___ DATE: _____
21-18 ☐ ___ DATE: _____
21-19 ☐ ___ DATE: _____
21-20 ☐ ___ DATE: _____
21-21 ☐ ___ DATE: _____

EDGE. ABBR.

22-A- 1 ☐ ___ DATE: _____
22-A- 2 ☐ ___ DATE: _____
22-A- 3 ☐ ___ DATE: _____

DRILL JIG COMPTS.

22-B- 1 ☐ ___ DATE: _____
22-B- 2 ☐ ___ DATE: _____
22-B- 3 ☐ ___ DATE: _____
22-B- 4 ☐ ___ DATE: _____

DRILL JIG DOOR.

22-C- 1 ☐ ___ DATE: _____
22-C- 2 ☐ ___ DATE: _____
22-C- 3 ☐ ___ DATE: _____
22-C- 4 ☐ ___ DATE: _____

MILL. FIXT. COMPTS.

22-D- 1 ☐ ___ DATE: _____
22-D- 2 ☐ ___ DATE: _____
22-D- 3 ☐ ___ DATE: _____

MILL. FIXT. EDGE.

22-E- 1 ☐ ___ DATE: _____
22-E- 2 ☐ ___ DATE: _____
22-E- 3 ☐ ___ DATE: _____
22-E- 4 ☐ ___ DATE: _____

STUDENT'S NAME

LAST FIRST M

HIGH SCHOOL

BIRTH DATE

OFFICIAL STUDENT PROGRESS RECORD
for
Machine Shop

NOTICE TO INSTRUCTOR(s): This is an OFFICIAL record of the student's progress in the course. Please follow these directions EXACTLY!

1. Draw a line through all LAPs which you do not require of the student to get credit for the unit.

2. Place a check in the block beside each required LAP when:

   a. You have PLACED the student on the LAP, or

   b. You are giving the student CREDIT for the LAP because of THEIR PERSONAL KNOWLEDGE that the student has competence in the training required by the LAP.

3. Optional: Space is provided for your initials and the date.

4. Be sure to complete ALL other relevant information about the student on this form.

5. If the student completes the course or withdraws from the course for ANY reason, complete the reverse side of this form and IMMEDIATELY forward to the records office.

Instructor's signature:

_____

SDE 26-061-00
(This form becomes obsolete 6/30/80)

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MACHINE SHOP TRANSCRIPT EVALUATION FORM

Name of student being evaluated _____

Vocational center attended _____

Date of graduation / Date of evaluation _____

Name of evaluator _____

AV-AV used, not necessarily objective

( ) - objective but not necessarily AV used

I - Introduced at this point, proficiency expected next quarter

• - increased expectation tolerance with usage

I• - Introduced in specific unit, expected proficiency by end of quarter

• - performance evaluated

• "pencil & paper" explained

•, I - tolerance initially less than stated objective

Complete information on back of form before beginning evaluation.

MACHINE SHOP TRANSCRIPT EVALUATION FORM

Name _____

- 1st QUARTER -

Introduction

____5-1.
____5-3.
____5-4.
____(5-7)+
____7-1.
____(10-5).
____(10-26)+
____11-1.
____(11-2)
____(11-3).
____(11-4)
____11-5.
____(12A-2).
____(12A-6)+
____(12A-7).

End of First Quarter

____(7-12).
____(7-13).
____(8-1-I)+
____(9-2).
____(9-3).
____(9-5)+

Project 1-A

____3-1+
____3-8+
____3-10+
____9-1-AV.
____9-11+
____10-3-AV+
____10-4+
____10-6-I+
____10-12-I
____10-13+
____10-15-AV+
____10-23-I+

Project 1-B

____3-1+
____3-10-AV+
____3-16-AV+
____3-19-AV-I
____4-1+
____5-2+
____5-5+
____7-2+
____(7-3)+
____(7-4)+
____7-5+
____(7-6)+
____7-7+
____9-11+
____10-4+
____12A-10+
____14-1.
____14-2-I+
____14-3-I+
____14-4-I+

Project 2-A

____3-1+
____3-8+
____3-10-AV+
____3-13+
____3-19-I*+
____9-11+
____10-3+
____10-4+
____10-6-AV-I+
____10-8-AV-I+
____10-13-AV+
____10-15-AV+
____10-17+
____10-20-AV
____10-22-AV-I*+

Project 2-B

____3-1+
____3-7
____3-8+
____3-10+
____3-16+
____3-19-AV
____(3-20)+
____3-24+
____4-3+
____4-7-AV
____5-2+
____5-5+
____(7-4)+
____7-5+
____(7-9)+
____(7-10)+
____(7-11)+
____9-11+

- 2nd QUARTER

Project 3-A

____3-1+
____3-8*
____3-17-I
____9-11+
____(10-14)+
____(10-15)+
____10-17+
____10-22-I*+
____11-6-I*+
____11-7-I*+
____11-9-I+
____12A-10

Project 3-B

____3-1+
____9-11-
____10-22-I*
____10-23-I+
____10-24
____10-25-L
____11-6-I*+
____11-7-I*+
____11-9-I+
____12A-10

Project 2-B Continued

____10-1.
____10-2.
____10-3+
____11-11-I+
____12A-3-AV+
____12A-4-AV+
____12A-10+
____14-2-I*
____14-3-I*
____14-4-I

- 3rd QUARTER

Project 4

____3-19+
____(8-1)+
____10-7-AV-I+
____10-8+
____10-9+
____10-10+
____10-12-AV+
____10-17+
____10-18+
____10-22+
____10-25.
____11-6+
____11-7+
____11-9+
____11-10+
____12A-10+
____12B-6-I+
____15-1+

Project 5

____3-10-AV-Rev.+
____3-12-AV-I+
____10-12+
____10-16+
____10-18+
____10-23+
____15-1+
____15-2+

Project 6-A

____5-6+
____6-1+
____6-2+
____(7-4)+
____7-5+
____10-6+
____10-7+
____11-6+
____11-7+
____11-9
____12A-10+
____12B-6+

Project 6-B

____5-6+
____6-1+
____6-2+
____(7-4)+
____7-5+
____10-6+
____10-7+
____10-21-AV.
____11-9+
____11-11+
____12A-10+
____14-2+
____14-3+
____14-4+

- 4th QUARTER

Project 10

____3-12+
____10-22+
____12A-10+
____(13-1).
____(13-2).
____(13-3).
____13-4+
____(13-5)+
____(13-7)+
____14-2+
____14-3+
____14-4+

AV-AV used, not necessarily objective

( ) - objective but not necessarily AV used

I - Introduced at this point, proficiency expected next quarter

* - increased expectation tolerance with usage

I* - Introduced in specific units, expected proficiency by end of quarter

+ - performance evaluated

. "pencil & paper" evaluated

+, I - tolerance initially less than stated objective

27

TUITION SCHOLARSHIP

Greenville Technical College is proud to offer tuition scholarships in each of the Articulation Grant programs: Machine Tool Technology, Industrial Electricity, and Engineering Graphics Technology. These scholarships were suggested at an Articulation Grant Advisory Committee meeting and hardily approved by the Greenville Technical College administration. It is hoped their inception will stimulate interest in continuing quality education and training in these fields.

The Donaldson, Enoree, and Foothills Vocational Centers will each select their most outstanding and/or worthy student in their drafting, electricity, and machine shop programs. Wade Hampton High School will select a student from their electricity program. The three scholarship students from each center will receive one quarter of tuition free study at Greenville Technical College. After their first quarter, each student may receive an extension for another quarter based upon review and approval by his or her instructors and department head.

After the selection of the students by their instructors, the director or principal of each school should send a copy of all the names to the heads of the Industrial and Technical Divisions, Mr. J.D. Warren and Mr. Lee Carraway. This is necessary to insure the tuition waiver be available when the student begins.

GUIDANCE INFORMATION FORM

This form was designed to supply feedback to guidance counselors, instructors, and administrators. It will be sent by the Greenville Technical College department involved to the vocational center each time there is a horisontal line of asterisks. The information on the form will supply data to evaluate our effectiveness and suggest continuation or change in our procedures.

+ + + +

MACHINE SHOP

ARTICULATION STUDENT'S PROGRESS

Your student,_____, from _____

Vocational Center has exempted through MTT_____ (quarter _____) and

may (conditionally, unconditionally) enroll in MTT_____(quarter___).

This placement was based on

_____the "machine shop transcript" only
_____the "machine shop transcript" and an interview
requested by _____ and conducted by _____
_____vocational instructor's recommendation

The student

_____readily accepted placement
_____requested a lower placement - outcome _____
_____requested a higher placement - outcome _____

Date of evaluation _____

The student at mid-term has been re-evaluated and is

_____progressing satisfactorily
_____moved back to level of competence
(may be able to finish quarter's work, may have to take Inc.)

_____ _____

Student's signature Instructor's signature

Date _____

The student at the end of the first quarter of work

_____successfully completed MTT_____(grade ____) on _____(date).
_____received an incomplete
_____dropped out before end of quarter

Student's status at the end of the first year of work-_____

_____

I GIVE MY PERMISSION FOR THE INFORMATION ON THIS SHEET TO BE RELEASED TO GREENVILLE COUNTY SCHOOL SYSTEM.

DATE _____ LEGAL SIGNATURE _____ SIGNATURE OF PARENT IF UNDER 18 _____

MACHINE SHOP UNITS

UNIT 1 MATH - MATH DEPT.
UNIT 2 BLUEPRINT READING - ENGINEERING GRAPHICS DEPT.
UNIT 3 MEASURING
UNIT 4 LAYOUT
UNIT 5 BENCH WORK
UNIT 6 BENCH/PEDISTAL GRINDING
UNIT 7 DRILL PRESS
UNIT 8 DRILL GRINDING
UNIT 9 POWER SAWS
UNIT 10 ENGINE LATHES
UNIT 11 MILLING MACHINES
UNIT 12A VERTICAL MILLING
UNIT 12B HORIZONTAL MILLING
UNIT 13 SHAPER
UNIT 14 SURFACE GRINDING
UNIT 15 TOOL POST GRINDING
UNIT 16 UNIVERSAL GRINDING

UNITS TO BE USED AT GREENVILLE TEC

1ST QUARTER AT GREENVILLE TEC
INTRODUCTION

MS-3-1
MS-3-7
MS-3-8
MS-3-10

MS-4-1
MS-5-1
MS-5-3
MS-7-1

PROJECT 1A

MS-9-1
MS-9-11
MS-10-3
MS-10-12
MS-10-23
MS-10-15
MS-10-6
MS-10-13
MS-3-8
MS-3-1
MS-3-10

PROJECT 1B

MS-9-11
MS-12A-10
MS-3-10
MS-3-16
MS-3-19
MS-12A-10
MS-3-16
MS-7-2
MS-7-7
MS-14-1
MS-14-2
MS-14-3
MS-14-4
MS-14-5

1ST QUARTER (Continued)

PROJECT 2A
MS-10-1
MS-10-2
MS-10-3
MS-10-4
MS-10-6
MS-10-8
MS-10-13
MS-10-15
MS-10-20
MS-10-22
MS-3-13
MS-3-8
MS-3-10

PROJECT 2B
MS-12A-10
MS-3-16
MS-3-19
MS-3-18
MS-3-24
MS-3-8
MS-3-7
MS-7-5
MS-4-7
MS-12A-3
MS-12A-4
MS-12A-10 BORING
MS-3-10

PROJECT 3A
MS-11-6
MS-11-7
MS-11-9

INSTRUCTOR MAY SUGGEST REVIEW OF SLIDES AND TAPES AS NEEDED.

PROJECT 3B
MS-10-22
MS-10-23
MS-10-24

INSTRUCTOR MAY SUGGEST REVIEW OF SLIDES AND TAPES AS NEEDED.

PROJECT 4 (2ND QUARTER)
MS-10-25
MS-10-12
MS-11-10
MS-10-11
MS-10-18
MS-10-22 (if needed)
MS-12B-6
MS-11-7
MS-11-9

2ND QUARTER (Continued)

PROJECT 5A
MS-3-10 REVIEW
MS-3-12
MS-15-1 OPTION
MS-15-2 OPTION

THIS PROJECT MUST BE ASSEMBLED.

PROJECT 6A (3RD QUARTER)
MS-10-7
MS-11-7 REVIEW
MS-11-9 REVIEW

ASSEMBLY.

PROJECT 6B
MS-10-21

NOTICE CLOSE TOLERANCE- GRINDING- HOLE CENTER-DISTANCE
SPACER LENGTH-ASSEMBLY

PROJECT 10 (4TH QUARTER)

STUDENT DRAWS HIS OWN PRINT- MAKES PARTS TO SPECIFICATION AND ASSEMBLES PARTS-SHOULD BE NO REVIEW AT THIS POINT.

MACHINE SHOP - UNIT 2 - BLUEPRINT READING

MS-2-1 INTRODUCTION TO BLUEPRINT READING

When you finish this learning package, you will be able to answer questions about blueprints and ablut the title block and notes on blueprints.

MS-2-2 ONE, TWO, AND THREE VIEW DRAWINGS

When you finish this learning package, you will be able to identify the different views of objects as shown by isometric drawings of the object.

MS-2-3 ALPHABET OF LINES

When you finish this learning package, you will be able to identify the different types of lines used in blueprints.

MS-2-4 SECTIONS

When you finish this learning package, you will be able to identify the following sections: full, half, offset, broken out, revolved, and removed.

MS-2-5 SCALE DRAWING

When you finish this learning package, you will be able to answer (basic) questions about (interpreting the) scale (of a) drawing.

MS-2-6 FINISH MARKS

When you finish this learning package, you will be able to identify and explain the finish marks on blueprints.

MS-2-7 FREEHAND SKETCHING

When you finish this learning package, you will be able t make freehand sketches of cylindrical, rectangular, and irregularly shaped work pieces.

MACHINE SHOP - UNIT 3 - MEASURING

MS-3-1 THE MACHINIST'S SCALE

When you finish this learning package, you will be able to use the machinist's scale to measure the length and width of a piece of stock. Your measurements must be within ± 1/64 of an inch of specifications.

MS-3-2 CENTER HEAD OF THE COMBINATION SET

When you finish this learning package, you will be able to locate and mark the center on both ends of a round bar of any size from $\frac{1}{4}$" to 6" using the center head of the combination set. Your marks must be within ± 1/32 of an inch of specifications.

MS-3-3 THE SQUARE HEAD OF THE COMBINATION SET

When you finish this learning package, you will be able to use the aquare head to scribe straight lines and angles to within ±1/32 of an inch of specification.

MS-3-4 DIVIDERS

When you finish this learning package, you will be able to use the machinist's scale and dividers to transfer the dimensions of a drawing to a workpiece. Your transferred measurements must be within ±1/64 of an inch of specifications.

MS-3-5 HERMAPHRODITE CALIPERS

When you have finished this learning package, you will be able to use the hermaphrodite caliper to: a-scribe parallel lines on a workpiece, and b-locate and mark the center of a round workpiece. Your work must be within ± 1/64 of an inch of specifications.

MS-3-6 OUTSIDE CALIPERS

When you finish this learning package, you will be able to use the outside caliper and the machinist's scale to measure the outside diameter of round workpieces to within ±1/64" of specifications.

MS-3-7 BEVEL PROTRACTOR

When you finish this learning package, you will be able to use the bevel protractor of the combination set to lay out, on a workpiece, the various angles called for on a set of specifications to within ±1/2°.

MS-3-8 OUTSIDE MICROMETER

When you finish this learning package, you will be able to use the outside micrometer to measure: the outside diameter of round stock, the thickness of flat stock, and the length of flat stock.

MS-3-9 INSIDE CALIPERS

When you finish this learning package, you will be able to use the inside calipers and the outside micrometer to measure the inside diameters of tubular stock to within ±.002" of specifications.

MS-3-10 TELESCOPING GAGE

When you finish this learning package, you will be able to use the telescoping gage and the outside micrometer to measure internal dimensions to within ±.001" of specifications

MACHINE SHOP - UNIT 3 CONTINUED - MEASURING

MS-3-11 INSIDE MICROMETER

When you finish this learning package, you will be able to assemble and use the inside micrometer to measure inside diameters of tubular stock to within ±.001" of specifications.

MS-3-12 DEPTH MICROMETER

When you finish this learning package, you will be able to assemble, adjust, and use the depth micrometer to measure the depth of holes and slots to within ±.001" of specifications.

MS-3-13 SCREW PITCH GAGE

When you finish this learning package, you will be able to use the screw pitch gage to measure the number of threads per inch on any given screw or bolt.

MS-3-13A SCREW THREAD MICROMETER

When you finish this learning package, you will be able to use the screw thread micrometer to measure the pitch diameter of screw threads to within ±.001" of specifications.

MS-3-14 VERNIER CALIPER

When you get finished with this learning package, you will be able to use the vernier caliper to measure the outside and inside diameters of round stock and the depths of holes and slots to within ±.001" of specifications.

MS-3-15 SURFACE GAGE

When you finish this learning package, you will be able to use the surface gage to measure and scribe lines on vertical surfaces to within ±.010" of specifications.

MS-3-16 VERNIER HEIGHT GAGE

When you finish this learning package, you will be able to use the vernier height gage to make comparison checks to within ±.001" of specifications.

MS-3-17 OPTICAL COMPARATORS

When you have finished this learning package, you will be able to answer questions about optical comparators and how they work.

MS-3-18 GAGE BLOCKS AND DIAL INDICATORS

When you finish this learning package, you will be able to use gage blocks to verify the accuracy of a dial indicator to within ±.0001".

MS-3-19 DIAL INDICATOR

When you finish this learning package, you will be able to use the dial indicator to check the concentricity (roundness) of round stock to within ±.001".

MS-3-20 DIAL INDICATOR - VISE ALIGNMENT

When you finish this learning package, you will be able to use the dial indicator to aling a vise on a milling machine to within ±.001" of specifications.

MS-3-21 RADIUS GAGE

When you finish this learning package, you will be able to use a radius gage to measure convex and concave radii of parts.

MS-3-22 PLANER GAGE

When you finish this learning package, you will be able to adjust the planer gage to a given height.

MS-3-23 VERNIER BEVEL PROTRATOR

When you finish this learning package, you will be able to use the universal vernier bevel protractor to lay out a given angle, with an accuracy of $\pm$ 0°5'.

MS-3-24 SINE BAR

When you finish this learning package, you will be able to use a sine bar to measure and set up various angles with an acuracy of $\pm$0°5'.

MS-3-25 SNAP GAGES

When you finish this learning package, you will be able to use snap gages to measure lengths, diameters, and thicknesses of parts.

MS-3-26 GEAR TOOTH VERNIER CALIPER

When you finish this learning package, you will be able to use a gear tooth vernier caliper to measure the addendum and the chordal thickness of any gear tooth.

MACHINE SHOP - UNIT 4 - LAYOUT

MS-4-1 INTRODUCTION TO LAYOUT TOOLS AND ACCESSORIES

When you finish this learning package, you will be able to identify basic layout tools and answer questions about their use.

MS-4-2 USING LAYOUT TOOLS: PART 1

When you finish this learning package, you will be able to layout fluid, scriber, dividers, trammels, hermaphrodite calipers, and prick punch to do layout work to specifications.

MS-4-3 USING LAYOUT TOOLS: PART 2

When you finish this learning package, you will be able to use the vernier height gage, magnifying glass, angle plate, toolmaker's square, c-clamps, parallel clamps, 1-2-3 step blocks, precision square, gage blocks, and sine bar to do layout work to specifications.

MS-4-4 USING LAYOUT TOOLS: PART 3

When you finish this learning package, you will be able to use the combination set, vernier protractor, and protractor depth gage to do inspection and layout work to specifications.

MS-4-5 USING LAYOUT TOOLS: PART 5

When you finish this learning package, you will be able to use the surface gage, dial indicator, planer gage, center punch, and hammer to do layout work to specifications.

MS-4-6 LAYING OUT A T-SLOT CLEANER

When you finish this learning package, you will be able to layout a T-slot cleaner to specifications.

MS-4-7 LAYING OUT A DRILL AND TAP BLOCK

When you finish this learning package, you will be able to lay out a series of six holes on a drill and tap block.

MACHINE SHOP - UNIT 5 - BENCH WORK

MS-5-1 INTRODUCTION TO BENCH TOOLS

When you finish this learning package, you will be able to identify basic bench tools.

MS-5-2 THE BENCH VISE

When you finish this learning package, you will be able to name the parts of a bench vise and do clamping operations on the vise according to specifications.

MS-5-3 FILES AND FILING

When you finish this learning package, you will be able to identify basic files used in machining and file work pieces accurately to specifications.

MS-5-4 HAND HACK SAWS

When you finish this learning package, you will be able to identify and properly use hand hack saws to cut metals.

MS-5-5 TAPS AND DIES

When you finish this learning package, you will be able to identify and properly use taps and dies to cut threads on work pieces to specifications.

MS-5-6 HAND REAMING

When you finish this learning package, you will be able to use hand reamers properly to ream holes in metals to specified sizes.

MS-5-7 HAMMERS, SCREW DRIVERS, CHISELS, PLIERS, AND WRENCHES

When you finish this learning package, you will be able to identify and properly use hammers, screw drivers, chisels, pliers, and wrenches.

MACHINE SHOP - UNIT 6 - BENCH AND PEDESTAL GRINDING

MS-6-1 GRINDING WHEELS

When you finish this learing package, you will be able to use reference charts to select proper grinding wheels. You will be able to install the wheels on a grinder, adjust the wheels, and adjust the tool rest.

MS-6-2 DRESSING WHEELS

When you finish this learning package, you will be able to true and dress a grinding wheel for normal grinding operations.

MS-6-3 GRINDING A RADIUS

When youbfinish this learning package, you will be able to grind a $\frac{1}{4}$" radius to fit a $\frac{1}{4}$" gage.

MACHINE SHOP - UNIT 7 - DRILL PRESS

MS-7-1 INTRODUCTION TO DRILL PRESS

When you finish this learning package, you will be able to name each control on a upright drill press and tell what each control does.

MS-7-2 SETUPS FOR DRILLING

When you finish this learning package, you will be able to use the proper holing devices to set up for the following drilling tasks: round stock, flat stock, sheet metal, irregular shapes.

MS-7-3 DRILL PRESS CUTTING TOOLS

When you finish this learning package, you will be able to identify cutting tools used in a drill press and tell what each one does.

MS-7-4 ADAPTERS AND SLEEVES

When you finish this learning package, you will be able to use sleeves and/or chucks to change the holding capacity of a drill press spindle.

MS-7-5 DRILLING HOLES

When you finish this learning package, you will be able to choose correct feeds and speeds for drilling holes in steel and aluminum. Accuracy will be $\pm$ 1/32".

MS-7-6 DEPTH DRILLING

When you finish this learning package, you will be able to use the drill press depth stops to drill holes to a specified depth, with an accuracy of $\pm$ 1/16".

MS-7-7 COUNTERBORING, COUNTERSINKING, AND SPOT FACING

When you finish this learning package, you will be able to use the proper tool to counter sink, counterbore, and spot face drilled holes to a tolerance of $\pm$ 1/32".

MS-7-8 ANGULAR HOLES

When you finish this learning package, you will be able to make table adjustments and use proper holding devices to drill angular holes in metal, to an accuracy of $\pm$ 1/32".

MS-7-9 RADIAL DRILL PRESS

When you finish this package, you will be able to answer questions about the parts and controls of a radial drill press and tell what each does.

MS-7-10 REAMING

When you finish this learning package, you will be able to use a straight or taper shank reamer to ream holes to a specified size, with an accuracy of $\pm$ 1/64".

MS-7-11 MACHINE TAPPING

When you finish this learning package, you will be able to use the proper tap drill size, tap, and tapping attachment to drill tap holes as shown on drawings, with an accuracy of $\pm$ 1/32".

MS-7-12 PARTS OF A TWIST DRILL

When you finish this learning package, you will be able to name the parts of a twist drill and tell the purpose of each.

MS-7-13 TWIST DRILL SIZES

When you finish this learning package, you will be able to use charts and drill gages to select the proper size drill for a given application.

MS-7-14 TRANSFERRING HOLES

When you finish this learning package, you will be able to transfer holes from one piece of work to another by spotting with a twist drill, using a transfer punch, and using transfer screws.

MACHINE SHOP - UNIT 8 - DRILL GRINDING

MS-8-1 FREEHAND DRILL SHARPENING

When you finish this learning package, you will be able to use the bench or pedestal grinder to sharpen a dull twist drill. Using a drill bit gage as a guide, you will be able to: keep the point angle to within $\pm \frac{1}{2}^{o}$ and keep the point centered to within $\pm$ 1/64" drill lip length.

MS-8-2 MACHINE DRILL SHARPENING

When you finish this learning package, you will be able to set up and operate a machine drill grinder to sharpen a two-lip twist drill and a three or four-lip core drill.

MACHINE SHOP - UNIT 9 - POWER SAWS

MS-9-1 POWER SAWS: PARTS AND CONTROLS

When you finish this learning package, you will be able to name the main parts and controls of the horizontal band saw, the vertical band saw, and the power hack saw.

MS-9-2 CHOOSING POWER SAW BLADES

When you finish this learning package, you eill be able to choose the correct power saw blade for a given application.

MS-9-3 FREQUENT SAWING PROBLEMS

When you finish this learning package, you will be able to answer questions about diagnosing and correcting problems often met when using the power hacksaw, vertical band saw, and horizontal band saw.

MS-9-4 SETTING BLADE SPEEDS

When you finish this learning package, you will be able to use charts or a job dial selector to choose the proper speed of a band saw blade for a given job.

MS-9-5 SETTING UP POWER SAW CONTROLS

When you finish this learning package, you will be able to set up the operational controls of a power hack saw and a power band saw for a sawing operation.

MS-9-6 MOUNTING BAND SAW BLADES AND CUTTING STOCK

When you finish this learning package, you will be able to select, mount guides, and install blades on the vertical band saw, and cut stock with a vertical band saw to an accuracy of $\pm$ 1/16".

MS-9-7 WELDING BAND SAW BLADES

When you finish this learning package, you will be able to use the bulk blade provided and the welding attachment on the vertical band saw to weld band saw blades. You will weld blades to specified lengths for particular saws and to the thickness required by the blade thickness gage on the vertical band saw.

MS-9-8 VERTICAL BAND SAW: CUTTING CIRCLES, CONTOURS, AND STRAIGHT LINES

When you finish this learning package, you will be able to use the vertical band saw to cut contours, circles, and straight lines with an accuracy of $\pm$ 1/16".

MS-9-9 FRICTION SAWING

When you finish this learning package, you will be able to set up a vertical band saw for friction sawing of thins sheet metal.

MS-9-10 BAND FILING

When you finish this learning package, you will be able to select and set up a band file for a band filing job.

MACHINE SHOP - UNIT 9 CONTINUED - POWER SAWS

MS-9-11 HORIZONTAL BAND SAW: STRAIGHT AND ANGLE CUTS

When you finish this learning package, you will be able to use the horizontal band saw to cut stock, with an accuracy of $\pm$ 1/16" and to make angular cuts with an accuracy of $\pm$ 1°.

MS-9-12 FINISHING A T-SLOT CLEANER

When you finish this learning package, you will be able to finish a T-slot cleaner to blueprint specifications.

MS-9-13 FINISHING A DRILL AND TAP BLOCK

When you finish this learning package, you will be able to finish a drill and tap block to blueprint specifications.

MACHINE SHOP - UNIT 10 - ENGINE LATHE

MS-10-1 LATHE PARTS AND CONTROLS
When you finish this learning package, you will be able to point out the main parts and controls of an engine lathe.

MS-10-2 CUTTING SPEEDS AND FEEDS
When you finish this learning package, you will be able to choose proper feeds and speeds used to machine different kinds of metals on the lathe.

MS-10-3 INSTALLING CHUCKS
When you finish this learning package, you will be able to install all of the chucks used on a lathe.

MS-10-4 TOOL BIT GRINDING
When you finish this learning package, you will be able to: identify and sketch basic lathe tools, grind a general purpose tool bit for use on the engine lather.

MS-10-5 FOUR-JAW CHUCK TRUING
When you finish this learning package, you will be able to true a piece of rouns stock in a 4-jaw chuch.

MS-10-6 FACING TO LENGTH
When you finish this learning package, you will be able to machine a workpiece to a given length using a facing tool on an engine lathr with an accuracy of $\pm$.001".

MS-10-7 COLLET ASSEMBLY AND CENTER DRILLING
When you have finished this learning package, you will be able to: set up a collet assembly on a lather, center drill a workpiece on the lathe.

MS-10-8 GRADUATED MICROMETER COLLAR: ROUGH AND FINISH TURNING
When you finish this learning package, you will be able to use a graduated micrometer collar to turn a workpiece to a specified diameter, with an accuracy of $\pm$ .001".

MS-10-9 NECKING
When you finish this learning package, you will be able to do a necking operation on an engine lathe.

MS-10-10 MOUNTING WORK BETWEEN CENTERS
When you finish this learning package, you will be able to mount a workpiece between centers properly.

MS-10-11 ALIGNING THE TAILSTOCK
When you finish this learning package, you will be able to adjust the lathe tailstock properle for turning a work between centers with an accuracy of $\pm$ .001".

MS-10-12 DRILLING AND REAMING ON THE LATHE
When you finish this learning package, you will be able to drill and ream a workpiece on an engine lathe to a specified size.

MS-10-13 TURNING WORK ON A MANDREL
When you finish this learning package, you will be able to use a mandrel to turn a workpiece to a specified diameter.

MS-10-14 TURNING TO SQUARE AND FILLETED SHOULDERS
When you finish this learning package, you will be able to cut a square and a filleted shoulder properly.

MS-10-15 FILING AND POLISHING
When you finish this package, you will be able to file and polish a work piece on a lathe to a specified size.

MS-10-16 KNURLING
When you finish this learning package, you will be able to knurl a workpiece on a lathe.

MS-10-17 TAPER TURNING WITH A COMPOUND REST
When you finish this learning package, you will be able to turn a taper on a workpiece using the compound rest.

MS-10-17A CALCULATING TAPERS
When you finish this learning package, you will be able to: calculate proper compound rest angle settings for turning tapers using formulas and trigonometric tables and calculate taper per foot and taper per inch using formulas.

MS-10-18 TAPER TURNING AND TAPER ATTACHMENT
When you finish this learning package, you will be able to turn a taper using the taper attachment for the lathe.

MS-10-19 TAPER TURNING WITH OFFSET TAILSTOCK
When you finish this learning package, you will be able to cut a taper using the offset tailstock method.

MS-10-20 EXTERNAL THREADING WITH THREADING DIE AND HOLDER
When you finish this learning package, you will be able to use the engine lathe to cut threads on a workpiece with a threading die and holder.

MS-10-21 TURNING ON THE LATHE
When you finish this learning package, you will be able to cut an internal thread with the lathe by using a tap and holder.

MS-10-22 THREADING ON THE LATHE: EXTERNAL THREAD CHASING
When you finish this learning package, you will be able to: cut threads on a workpiece by using the lathe thread cutting mechanisms and chase external threads using a lathe.

MS-10-23 BORING BAR

When you finish this learning package, you will be able to bore a hole to size on a lathe.

MS-10-24 INTERNAL THREADING

When you finish this learning package, you will be able to cut internal threads using the thread chasing mechanism.

MS-10-25 STEADY REST

When you finish this learning package, you will be able to set up and machine a long workpiece using a steady rest.

MS-10-26 FOLLOW REST

When you finish this learning package, you will be able to set up and machine a workpiece using the follow rest.

MS-10-27 FORM TURNING

When you finish this learning package, you will be able to turn a radius on the lathe by hand.

MACHINE SHOP - UNIT 11 - MILLING : INTRODUCTION

MS-11-1 KINDS OF MILLING MACHINES

When you finish this learning package, you will be able to point out and name six different kinds of milling machines and briefly describe their uses.

MS-11-2 LUBRICATION AND PREVENTINE MAINTENANCE

When you finish this learning package, you will be able to lubricate and perform preventive maintenance on milling machines.

MS-11-3 SPEEDS AND FEEDS

When you finish this learning package, you will be able to figure speeds and feeds on a milling machine for given cutters and work materials.

MS-11-4 CUTTING FLUIDS AND OILS

When you finish this learning package, you will be able to identify, mix, and apply cutting fluids and oils in milling machine operations.

MS-11-5 ACCESSORIES AND ATTACHMENTS

When you finish this learning package, you will be able to point out and name several milling machine attachments and tell what is used for.

MS-11-6 INDEXING HEADS AND DIRECT INDEXING

When you finish this learning package, you will be able to: point out and name the five basic parts of an indexing head, describe the use of each part, and set an indexing head up for direct indexing.

MS-11-7 SIMPLE INDEXING

When you finsh this learning package, you will be able to change an index plate and set up an indexing head for simple indexing.

MS-11-8 ANGULAR INDEXING

When you finish this learning package, you will be able to: set up an indexing head for angular indexing and use the proper formulas to figure angular indexing settings.

MS-11-9 PREPARING THE HEAD FOR INDEXING

When you finish this learning package, you will be able to prepare an indexing head along with the footstock (tailstock).

MS-11-10 INDEXING: ALIGNMENT OF CENTERS

When you finish this learning package, you will be able to align the centers of an indexing head and tailstock with an aligning bar and dial indicator.

MS-11-11 VISE AND TABLE ALIGNMENT

When you finish this learning package, you will be able to: align a milling machine vise with a square, a dial indicator, and the marks on the vise base and align the table of a milling machine with the column face.

MS-11-12 ROTARY TABLE AND SLOTTING ATTACHMENT

When you finish this learning package, you will be able to identify and briefly describe the uses of the rotary table and slotting attachment.

MACHINE SHOP - UNIT 12 - MILLING MACHINES: VERTICAL AND HORIZONTAL
SECTION A - VERTICAL MILLING MACHINES

MS-12A-1 SOUTH BEND RAM TURRET: PARTS AND CONTROLS
When you finish this learning package, you will be able to name the parts and controls of a South Bend Ram Turret vertical milling machine and describe what each control does.

MS-12A-2 CINCINNATI NO. 3: PARTS AND CONTROLS
When you finish this learning package, you will be able to point out and name the parts and controls of the Cincinnati No. 3 vertical milling machine and describe what each control does.

MS-12A-3 MODEL "J" BRIDGEPORT: PARTS AND CONTROLS
When you finish this learning package, you will be able to point out and name the parts and controls of the Model "J" Bridgeport vertical head milling machine and describe what each control does.

MS-12A-4 MODEL "J" BRIDGEPORT: VERTICAL HEAD ALIGNMENT"
When you finish this learning package, you will be able to align the head of a Model "J" Bridgeport vertical head milling machine.

MS-12A-5 MODEL "2J" BRIDGEPORT: PARTS AND CONTROLS
When you finish this learning package, you will be able to point out and name the parts and controls of the Model "2J" Bridgeport vertical head milling machine and describe what each control does.

MS-12A-6 CINCINNATI MODEL "D" TOOLMASTER: PARTS AND CONTROLS
When you finish this learning package, you will be able to point out and name the parts and controls of the Cincinnati Model "D" Toolmaster vertical milling machine and describe what each control does.

MS-12A-7 VAN NORMAN MODEL 13: PARTS AND CONTROLS
When you finish this learning package, you will be able to point out and name the parts and controls of the Van Norman Model 13 milling machine and describe what each control does.

MS-12A-8 VERTICAL MILLING MACHINE CUTTERS
When you finish this learning package, you will be able to point out and name cutters used in vertical milling operations and describe their uses.

MS-12A-9 MOUNTING CUTTERS AND CUTTING A KEYSEAT
When you finish this learning package, you will be able to mount vertical milling machine cutters properly and cut a keyseat, using a 4-flute end mill.

MS-12A-10 VERTICAL MILLING SETUPS AND OPERATIONS
When you finish this learning package, you will be able to identify and make setups on a vertical milling machine.

MACHINE SHOP - UNIT 13 - SHAPER

MS-13-1 SHAPER: PARTS AND LUBRICATION

When you finish with this learning package, you will be able to name the main parts of a shaper and lubricate a shaper to manufacturer's specifications.

MS-13-2 SHAPER CONTROLS

When you finish this learning package, you will be able to name the operating controls of the shaper and tell what each does.

MS-13-3 CUTTING TOOLS

When you finish this learning package, you will be able to name common cutting tools used on the shaper and describe and tell the purpose of the angles ground on each tool.

MS-13-4 VISE ALIGNMENT: SHAPER SAFETY

When you finish this learning package, you will be able to: level and align a shaper vise using a dial indicator and a precision square or parallel, and state important safety rules about the shaper swivel head and vertical tool head.

MS-13-5 MACHINING A FLAT, HORIZONTAL SURFACE

When you finish this learning package, you will be able to set up and machine a flat, horizontal surface on a shaper.

MS-13-6 SETUPS FOR VERTICAL AND ANGULAR CUTS

When you finish this learning package, you will be able to set up a shaper and machine vertical and angular cuts on a workpiece to given specifications.

MS-13-7 FEEDS AND SPEEDS

When you finish this learning package, you will be able to figure proper feeds and speeds for different shaper operations, using formulas and charts and set a shaper for a given cutting speed, number of strokes per minute, and feed per stroke.

MACHINE SHOP - UNIT 12 - MILLING MACHINES: VERTICAL AND HORIZONTAL
SECTION B - HORIZONTAL MILLING MACHINES

MS-12B-1 CINCINNATI UNIVERSAL NO. 2: PARTS AND CONTROLS

When you finish this learning package, you will be able to name and point out the parts and controls on the above milling machine and describe what each control does.

MS-12B-2 HORIZONTAL MILLING MACHINE CUTTERS

When you finish this learning package, you will be able to point out and name cutters used in horizontal milling operations and describe their uses.

MS-12B-3 MOUNTING HORIZONTAL MILLING CUTTERS

When you finish this learning package, you will be able to mount horizontal milling machine cutters properly.

MS-12B-4 HORIZONTAL MILLING SETUPS AND OPERATIONS

When you finish this learning package, you will be able to identify and make setups on a horizontal milling machine.

MS-12B-5 INSTALLING A VERTICAL HEAD ATTACHMENT

When you finish this learning package, you will be able to install, lubricate, and operate a vertical head milling attachment.

MS-12B-6 CUTTING A SPUR GEAR

When you finish this learning package, you will be able to set up a horizontal column and knee type milling machine for cutting a spur gear and cut a spur gear according to blueprint specifications.

MS-12B-7 CUTTING A RACK GEAR

When you finish this learning package, you will be able to set up a horizontal column and knee type milling machine for cutting a rack rear and cut a rack gear according to blueprint specifications.

MS-12B-8 CUTTING A HELICAL GEAR

When you finish this learning package, you will be able to set up a horizontal column and knee type milling machine for cutting a helical gear and cut a helical gear according to blueprint specifications.

MACHINE SHOP - UNIT 14 - SURFACE GRINDING

MS-14-1 SURFACE GRINDER PARTS AND CONTROLS

When you finish this learning package, you will be able to name the main parts and controls of a surface grinder.

MS-14-2 SELECTING AND CHANGING GRINDING WHEELS

When you finish this learning package, you will be able to select and change grinding wheels on a surface grinder to meet requirements of the material to be ground.

MS-14-3 MOUNTING AND DRESSING GRINDING WHEELS

When you finish this learning package, you will be able to select, test, mount, and dress the proper grinding wheel for a given job by using the diamond tip dresser to true the wheel in relation to the magnetic chuck.

MS-14-4 MAGNETIC CHUCKS

When you finish this learning package, you will be able to position and secure a workpiece on the magnetic chuck of the surface grinder and align the workpiece surface so that it is parallel to the face of the grinding wheel, using a dial indicator to get an accuracy of $\pm$.001".

MS-14-5 GRINDING A WORKPIECE

When you finish this learning package, you will be able to make a finish drawing and grind two parallel bars to the specifications of that drawing with an accuracy of $\pm$.0005".

MS-14-6 WHEEL DRESSING: CONVEX OR CONCAVE RADIUS

When you finish this learning package, you will be able to set up a radius dresser and dress a grinding wheel to a convex or concave radius.

MACHINE SHOP - UNIT 15 - TOOL POST GRINDING

MS-15-1 SETTING UP A TOOL POST GRINDER

When you finish this learning package, you will be able to set up a lathe and tool post grinder for a grinding operation.

MS-15-2 EXTERNAL TOOL POST GRINDING

When you finish this learning package, you will be able to grind a lather center point properly to fit a center gage in 55 minutes.

MS-15-3 REAMER SHARPENING ON THE TOOL POST GRINDER

When you finish this learning package, you will be able to sharpen a machine reamer properly on a tool post grinder in $1\frac{1}{2}$ hours.

MS-15-4 INTERNAL TOOL POST GRINDING

When you finish this learning package, you will be able to grind a drill bushing bore to blueprint specifications with a tool post grinder in one hour and twenty minutes.

ENGINEERING GRAPHICS TECHNOLOGY ARTICULATION

Greenville Technical College GREENVILLE, SOUTH CAROLINA · 29606

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ENGINEERING GRAPHICS TECHNOLOGY

ARTICULATION GRANT

GREENVILLE TECHNICAL COLLEGE

JUNE, 1976

OVERVIEW

In order for the graduates of the vocational high school drafting programs to enter the Engineering Graphics Technology program at Greenville Technical College at an advanced level, course objectives, an Employability Profile, and articulation procedures have been developed.

The concept sheets have been developed jointly by the instructors in the vocational high schools of Greenville County and the department head, division chairman and members of the Educational Development Team at Greenville Technical College. Their purpose is to help insure uniformity of objectives to be covered at either school or college.

The Student's Employability Profile shows the major mechanical drafting units plus a further breakdown of competencies that can be used by an instructor to keep a running account of a student's progress. The completed form supplied by the vocational school instructor will be used along with other data to help determine at what level the student may enter the Engineering Graphics Department at Greenville Technical College. The same form will be used at Greenville Technical College and the additional tasks and competencies will be checked as they are reached.

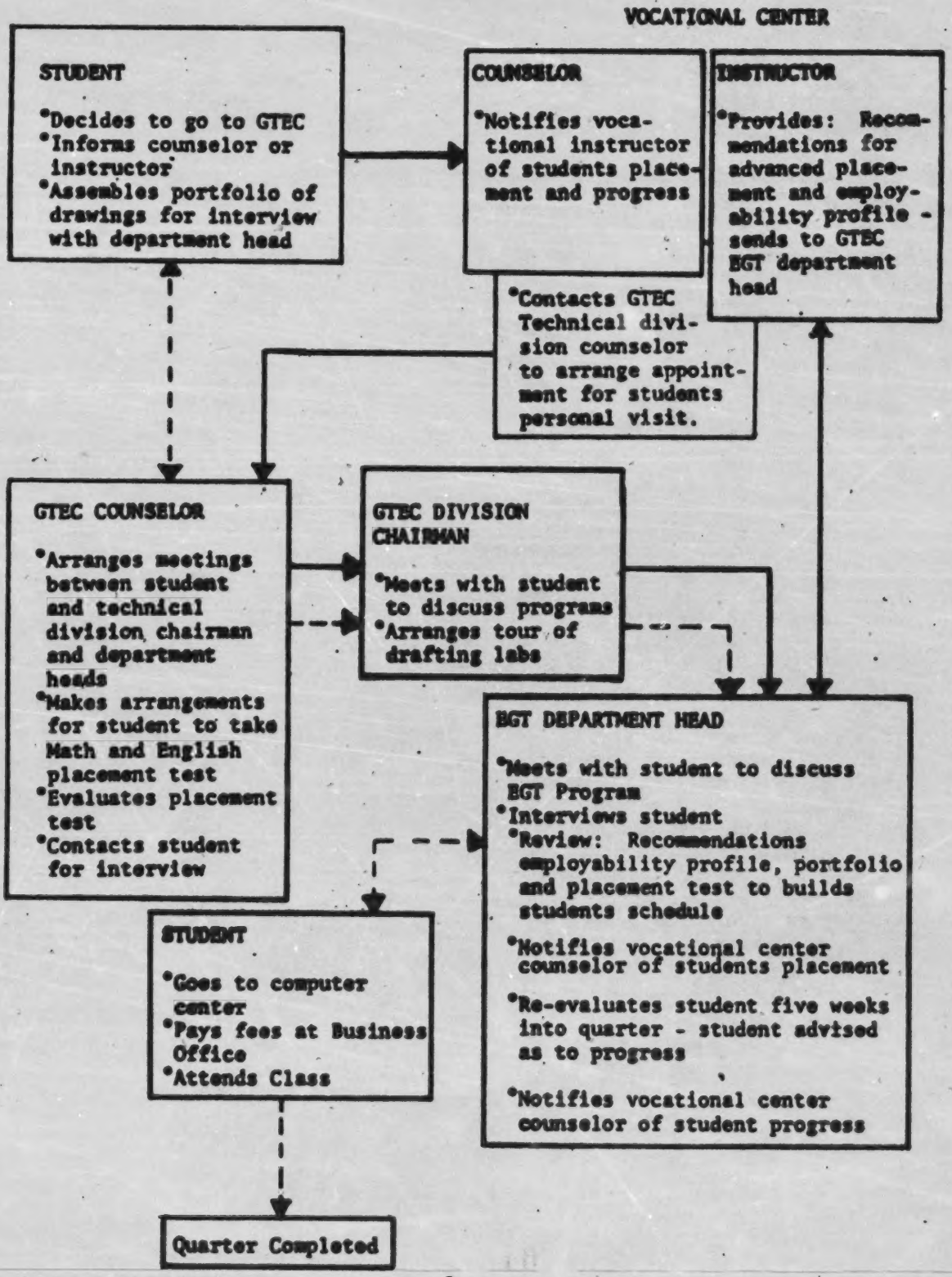
When the student leaves GTEC, the completed form may be used by an employer as a guide with reference to his technical skills accomplishments and also as an indication of his attitudes, behavior, and work habits.

The major units and competencies listed in the Employability Profile cover many specialized fields of drafting so that it is highly unlikely that any one student will cover them all even though he completes two years at a vocational school and two years at Greenville Technical College.

The following courses will be considered for exemption:

Course Title	Course Number
Engineering Graphics I	EGT 111
Engineering Graphics II	EGT 121
Engineering Graphics III	EGT 131
Related Drafting Courses	
Engineering Drawing I	EGT 112
Engineering Drawing II	EGT 122

FLOW CHART OF ARTICULATION STUDENTS - BGT


VOCATIONAL CENTER
STUDENT
•Decides to go to GTEC
•Informs counselor or instructor
•Assembles portfolio of drawings for interview with department head
COUNSELOR
•Notifies vocational instructor of students placement and progress
INSTRUCTOR
•Provides: Recommendations for advanced placement and employability profile - sends to GTEC EGT department head
•Contacts GTEC Technical division counselor to arrange appointment for students personal visit.
GTEC COUNSELOR
•Arranges meetings between student and technical division chairman and department heads
•Makes arrangements for student to take Math and English placement test
•Evaluates placement test
•Contacts student for interview
GTEC DIVISION CHAIRMAN
•Meets with student to discuss programs
•Arranges tour of drafting labs
EGT DEPARTMENT HEAD
•Meets with student to discuss EGT Program
•Interviews student
•Review: Recommendations employability profile, portfolio and placement test to builds students schedule
•Notifies vocational center counselor of students placement
•Re-evaluates student five weeks into quarter - student advised as to progress
•Notifies vocational center counselor of student progress
STUDENT
•Goes to computer center
•Pays fees at Business Office
•Attends Class
Quarter Completed

ARTICULATION EVALUATION PROCEDURE

Students who graduate from any Greenville area vocational centers' drafting program may be permitted to exempt one, two, or three quarters of engineering graphics from the Engineering Graphics curriculum or one quarter of engineering drawing from the Architectural Engineering Technology curriculum at Greenville Technical College.

The following steps should be taken by vocational school students who plan to apply for exemption from engineering graphics or engineering drawing courses.

1. By the middle of your senior year ask your instructor or counselor to contact the Technical Division counselor at GTEC and set up an appointment for you to make a personal visit.

2. Arrangements will be made by the GTEC counselor for you to meet the Technical Division chairman, the department heads and to visit the drafting labs while classes are in session.

3. Your counselor can make arrangements for you to take the placement test administered by GTEC either at your school or at GTEC.

4. The GTEC technical division counselor will evaluate your test and contact you to arrange for an interview.

5. Providing that you have met the general entrance requirements you will need a recommendation from your instructor for advanced placement. (This will be sent directly to the department head).

6. You will need an Employability Profile. (This will be sent directly to the department head by your instructor).

7. You will need a portfolio of your drawings either originals or prints. (Bring this with you when you are called for an interview with the GTEC department head).

GREENVILLE TECHNICAL COLLEGE
ENGINEERING GRAPHICS DEPT.
P. O. BOX 5616 STA. "B"
GREENVILLE, S. C. 29606
TELEPHONE, 242-3170 EXT. 253

EMPLOYABILITY PROFILE

Occupation: Drafting

SKILLS PROFICIENCY RATING

NAME _____
Last First

ADDRESS _____ PHONE _____

TOWN, STATE, ZIP _____

EVALUATOR _____ TITLE _____ DATE _____

RATING LEVELS:
1. Instruction Not Received
2. Needs More Instruction
3. Satisfactory
4. Outstanding

	1	2	3	4
BASIC TECHNIQUES				
Use & care of instruments & materials				
Alphabet of lines				
Lettering				
Use of scales				
GEOMETRIC CONSTRUCTIONS				
Basic constructions				
Basic applications				
MULTIVIEW DRAWINGS				
Orthographic projection				
Major views				
Selection of scales, sheet size, views				
DIMENSIONING				
Methods				
Rules				
PRECISION DIMENSIONING				
Standard fits and limits				
Tolerances				
Surface finishes				
SPECIAL VIEWS				
Full and half section, other sections				
Primary and double auxiliary views				

	1	2	3	4
FASTENERS				
Specification and representation				
Kinds and classifications of threads				
Springs				
WELDING				
Standards and symbols				
Application				
PRODUCTION DRAWING				
Assembly and detail				
Layout and design				
Bills of Materials, standard notes				
Revisions and related forms				
Detailed assembly				
DETAILED DRAWING - SPECIALIZED				
Casting and pattern				
Machine				
Stamping				
Welding				
Exploded view				
PICTORIAL DRAWING				
Isometric				
Oblique Projection				
Perspective				
TECHNIQUES IN INK				
Line work				
Lettering				
SKETCHING REPRODUCTION				
Prints				
Sepia				
Other				
RELATED INFORMATION				
Time cards and clock				
Time sheets				
Drawing no. and part no. system				
REFERENCES				
Machinery's Handbook				
Architectural Handbook				
Industrial catalogs				

	1	2	3	3
BASIC MATH INCLUDING METRIC SYSTEM				
Fractions and decimals				
Volumes and arms				
Weights				
Basic slide rule				
SPECIAL PROJECTS (LIVE WORK)				
Mechanical				
Electrical				
Construction				
Architectural				
Graphs & charts				
GEARS AND CAMS				
Nomenclature and profiles				
Introduction to formulae ratios				
Bearings				
OTHER DRAFTING AREAS				
Architectural				
Structural				
Plumbing, heating and air conditioning				
Electrical and electronic				
Map and topographical				
PRECISION DIMENSIONING				
Positional and form tolerances (true position)				
Maximum Material Condition				
Numerical control				
APPLYING FOR A JOB				
Appearance				
Attitude and feeling				
Filling out applications				
Resume				
What not to do				
References				
Interview Know-How				

COMMENTS

ATTITUDES, BEHAVIOR, AND WORK TRAITS

EVALUATION: Please draw circle around numbers that are most appropriate.

RELATIONSHIP WITH OTHERS
1. Unable to determine at this time
2. Has difficulty with others
3. Gets along satisfactorily
4. Exceptionally well accepted

COOPERATION
1. Unable to determine at this time
2. Generally not cooperative
3. Generally cooperative
4. Exceptionally cooperative

COURTESY
1. Unable to determine at this time
2. Poor attitudes, needs improvement
3. Generally courteous
4. Exceptionally courteous and considerate

DEPENDABILITY
1. Unable to determine at this time
2. Needs constant follow-up
3. Generally accepts responsibility
4. Exceptionally reliable

INITIATIVE
1. Unable to determine at this time
2. Never initiates action
3. Seldom needs prodding
4. Exceptionally good "self starter"

JUDGMENT
1. Unable to determine at this time
2. Often uses poor judgment
3. Usually makes the right decision
4. Above average in making decisions

SELF CONTROL
1. Unable to determine at this time
2. Tends to be excitable
3. Well balanced
4. Exceptionally well balanced

CONCENTRATION
1. Unable to apply self to job at hand
2. Concentration fluctuates
3. Satisfactory concentration level
4. Highly satisfactory

ADAPTABILITY TO NFW JOB TASKS
1. Cannot adjust to new assignment
2. Has difficulty adjusting
3. Adjusts adequately
4. Adjusts well to new assignments

MOTIVATION IN OCCUPATIONAL AREA
1. Unable to determine at this time
2. Lacks motivation
3. Average interest and application
4. Highly motivated

ADAPTABILITY
1. Unable to determine at this time
2. Has difficulty in adapting
3. Usually accepts change
4. Self reliant, imaginative

DEXTERITY REQUIREMENTS FOR THE OCCUPATION
1. Unable to determine at this time
2. Prognosis for success is poor
3. Is well suited. Shows potential
4. Highly suited to needs of occupation

CRAFTSMANSHIP AND SKILLS
1. Unable to determine at this time
2. Substandard work
3. Average performance
4. High standards of performance

EFFICIENCY AND PRODUCTION
1. Unable to determine at this time
2. Often wastes time and effort
3. Makes effort to work effectively
4. A steady and productive worker

SAFETY

1. Unable to determine at this time
2. Lacks genuine concern for safety
3. Satisfactory practice of safety
4. High regard for safety requirements

WRITTEN PERFORMANCE

1. Unable to determine at this time
2. Work is selfom good
3. Work is generally good
4. Work is consistently good

TOLERANCE

1. Cannot tolerate many obstacles
2. Has difficulty with obstacles
3. Generally sticks to job
4. Sticks to job in face of obstacles

CONSISTENCY OF WORK BEHAVIOR

1. Very unstable work behavior
2. Generally more erratic than not
3. Showed moderately steady work behavior
4. Showed steady work behavior

TUITION SCHOLARSHIP

Greenville Technical College is proud to offer tuition scholarships in each of the Articulation Grant programs: Machine Tool Technology, Industrial Electricity, and Engineering Graphics Technology. These scholarships were suggested at an Articulation Grant Advisory Committee meeting and hardily approved by the Greenville Technical College administration. It is hoped their inception will stimulate interest in continuing quality education and training in these fields.

The Donaldson, Enoree, and Foothills Vocational Centers will each select their most outstanding and/or worthy student in their drafting, electricity, and machine shop programs. Wade Hampton High School will select a student from their electricity program. The three scholarship students from each center will receive one quarter of tuition free study at Greenville Technical College. After their first quarter, each student may receive an extension for another quarter based upon review and approval by his or her instructors and department head.

After the selection of the students by their instructors, the director or principal of each school should send a copy of all the names to the heads of the Industrial and Technical Divisions, Mr. J.D. Warren and Mr. Les Caraway. This is necessary to insure the tuition waiver be available when the student begins.

GUIDANCE INFORMATION FORM

This form was designed to supply feedback to guidance counselors, instructors, and administrators. It will be sent by the Greenville Technical College department involved to the vocational center each time there is a horizontal line of asterisks. The information on the form will supply data to evaluate our effectiveness and suggest continuation or change in our procedures.

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ENGINEERING GRAPHICS

ARTICULATION STUDENT'S PROGRESS

Your student, _____, from _____

Vocational Center has exempted EGT _____, _____, _____, and may

(conditionally, unconditionally) enroll in EGT _____ (quarter ____).

This placement was based on

_____portfolio

_____employability profile filled out by _____

_____vocational instructor's recommendation

Date of evaluation _____

* * * *

ARTICULATED DRAFTING UNITS

FIRST QUARTER

1. Instrument Drawing (One View)
2. Lettering
3. Geometric Construction
4. Sketching and Shape Description
5. Dimensioning
6. Reproduction and Control of Drawing
7. Multiview Projection

SECOND QUARTER

8. Section Views
9. Auxiliary Views
10. Revolutions
11. Screw Threads and Fasteners
12. Isometric Drawings
13. Oblique Drawings
14. Intersections and Developments

THIRD QUARTER

15. Shop Processes
16. Working Drawings

EGT 111
COURSE

GREENVILLE TECHNICAL COLLEGE

CONCEPT/PERFORMANCE	CONDITIONS	CRITERIA
1.0 Instrument Drawing (One View)		
1.1 Demonstrate the use of drafting instruments	Given a drafting assignment to do on the drafting board where instruments and other basic drafting equipment is necessary	To the instructors' satisfaction
1.2 Do the assigned one view drafting problems	Drawings will be drawn to scale using the proper pencils on the assigned sheet size and title block layout. Drawing will be centered on the sheet.	ANSI Standards will be used to the instructors' satisfaction
1.3 Letter the necessary notes on the drawing and in the title block	Use the proper pencil to get dark, sharp lettering	It must be dark enough to make a good readable reproduction
2.0 Lettering		
2.1 Perform legible lettering exercises (letters, numbers, fractions symbols)	Drafting standards and handout examples will be followed. Proper number of strokes and direction of stroke must be used.	Lettering must be easy to read, reproducible and not more than a 5 variation away from verticle. Spacing between letters must have equal area within a 5% variation. Spacing between sentences must be uniform using two letter heights as the optimum.
2.2 Perform lettering exercises of words, sentences, and paragraphs.		

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30-11/75

EGT 111
COURSE

GREENVILLE TECHNICAL COLLEGE

CONCEPT/PERFORMANCE	CONDITIONS	CRITERIA
3.0 Geometric Construction		
3.1 Bisect lines, angles and construct figures.	Use drafting instruments as required to do the problems on the handout sheet or as assigned by instructor.	Bisected lines must measure within a tolerance of 1/64". Angles must be within 1/2 constructed figures must be to instructors' satisfaction.
3.2 Draw regular polygons.	Same as above.	To instructors' satisfaction.
3.3 Draw tangents to arcs, lines and circles.	Same as above.	Arcs and lines must be tangents to the instructors' satisfaction.
3.4 Make drawings that show the above techniques applied.	Complete one view drawings with points of tangency indicated.	To instructors' satisfaction.

EF-10/75

EGT 111

COURSE

GREENVILLE TECHNICAL COLLEGE

CONCEPT/PERFORMANCE	CONDITIONS	CRITERIA
4.0 Sketching and Shape Description		
4.1 Illustrate the six principle views used in describing the shape of an object graphically.	On paper using drafting instruments	100%
4.2 Illustrate the three principles dimensions.	Make 3 view drawings and label on each view length, width and/or depth as appropriate.	100%
4.3 Convert an isometric picture drawing on grid paper to three view sketches on grid paper.	Use the problems assigned in the text and do them on the grid paper provided.	All three views must be shown to scale in their proper positions.
4.4 Sketch 3 views of assigned objects on grid paper.	Problems assigned in text shows 2 views on grid paper, the third one is to be added.	The 2 views as shown plus the 3rd view must be shown in its proper position to scale with all necessary lines.
4.5 Add missing lines to complete the shape description of objects.	3 view problems are given with missing lines.	All lines must be added before assignment is complete.

EGT 111
COURSE

GREENVILLE TECHNICAL COLLEGE

CONCEPT/PERFORMANCE	CONDITIONS	CRITERIA
5.0 Dimensioning		
5.1 Demonstrate an understanding of how and where shape dimensions are placed on a drawing.	Problems will be given which show undimensioned views of a part. The student will measure the shape and place the dimensions on the view.	To the satisfaction of the instructor.
5.2 Demonstrate an understanding of how and where size dimensions are placed on a drawing.	Same as above, except that some additional information may be partially given i.e., thread class.	The same as above.
5.3 Demonstrate ability to completely define a part by selecting the views necessary to completely and correctly dimension it.	Both textbook problems and layout drawings will be used. The student must prepare the drawings and dimension them using drafting instruments.	To the satisfaction of the instructor: ANSI Y14 will serve as a standard for dimensioning practices. (Emphasis will be placed on linework, lettering, proper placement of dimensions, and choice of optimum method of dimensioning.)
6.0 Reproduction and Control of Drawing		
6.1 Demonstrate an understanding of a drawing identification system.	He will provide drawing and/or part number identification for a set of detail and assy drawings (See Para 5.2 & 5.3).	Drawing numbers must be chosen so as to avoid duplication, to the satisfaction of the instructor.
6.2 Demonstrate the ability to make a diazo print from a tracing.	Given a tracing, he will properly and safely operate a diazo print machine.	To instructor's satisfaction using both vellum and polyester base drawings
6.3 Demonstrate an understanding of the preparation and use of brownline drawings.	He will prepare a brownline of a tracing using similar technique as 6.2 above.	Ditto

SF-12/75

EGT 111

COURSE

GREENVILLE TECHNICAL COLLEGE

CONCEPT/PERFORMANCE	CONDITIONS	CRITERIA
7.0 Multiview Projections		
7.1 Make 3 view sketches.	To be made on 8 1/2 X 11 cross section paper from Isometric Sketching Problems on handouts or the ones in the text-book.	All three principal views must be in their proper positions and sketching must be to the instructors' satisfac-tion
7.2 Do the assigned Missing View Problems.	Given: 2 orthographic views to copy on cross section paper and the third view.	Same as above.
7.3 Do the assigned Missing Line Problems.	Given: 3 orthographic views with lines missing--Lines to be sketched in. May be either on a handout sheet or problems in the textbook.	All lines must be shown.

EGT 121

COURSE

GREENVILLE TECHNICAL COLLEGE

CONCEPT/PERFORMANCE	CONDITIONS	CRITERIA
8.0 Section Views		
8.1 Demonstrate a proficiency in the correct terminology relating to section views.	Written	Pass as a written test.
8.2 Make section drawings of cylindrical shaped objects.	Apply good standard sectioning principles to simple cylindrical shaped objects. Drawings will consist of one circular view and a full or half section as assigned by instructor.	Problems will be drawn until they show clearly to the instructor's satisfaction that the principles of sectioning are being applied in a neat and orderly manner.
8.3 Make section drawings of irregular shaped objects.	Same conditions as above.	Problems will be assigned until they are done to instructor's satisfaction.
8.4 Make section drawings showing revolved sections and broken-out sections.	Problems will be assigned from textbook or handouts.	To instructor's satisfaction.

EGT 121

COURSE

GREENVILLE TECHNICAL COLLEGE

CONCEPT/PERFORMANCE	CONDITIONS	CRITERIA
9.0 Auxiliary Views		
9.1 Demonstrate a proficiency in the use of correct terminology relating to auxiliary views.	Written	Make a passing grade on a written test.
9.2 Construct primary auxiliary view of objects with symmetrical planes	Problems showing orthographic views of objects will be given from which the auxiliary view will be drawn.	To the instructor's satisfaction.
9.3 Construct auxiliary view of objects that have asymetrical planes.	Textbook problems or handout sheets will be provided.	To the instructor's satisfaction.
9.4 Construct auxiliary views of objects with curved surfaces.	Problems to be assigned.	Same as above.

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EGT 121

COURSE

GREENVILLE TECHNICAL COLLEGE

CONCEPT/PERFORMANCE	CONDITIONS	CRITERIA
10.0 Revolutions		
10.1 Construct a three view drawing of an object with a revolution of the given front view about an axis perpendicular to the frontal plane.	Given a 3-view drawing and direction and/or degree of revolution.	100% correct projection methods I.01 accuracy answers line quality.
10.2 Same as above except revolve the right view about an axis perpendicular to profile plane.	"	"
10.3 Same as above with top view revolved about axis perpendicular to horizontal plane.	"	"
10.4 Successive revolution	"	"
10.5 Revolve a point about a normal axis.	Given axis, point and degrees of revolution.	1. To I.01 accuracy 2. Answers, line quality 3. And example
10.6 Revolve a point about an inclined axis.	"	"
10.7 Revolve a point about an oblique axis.	"	"
10.8 Revolve a line about as normal, inclined or oblique axis.	Given axis, line and degrees or position criteria for revolved line	1. To I.01 accuracy 2. To answer standard of line. 3. By example 4. Using revolution & auxiliary view methods as required.

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EGT 121

COURSE

GREENVILLE TECHNICAL COLLEGE

CONCEPT/PERFORMANCE	CONDITIONS	CRITERIA
11.0 Screw Threads & Fasteners		
11.1 Demonstrate knowledge concerning terminology used with screws, bolts, nuts, threads, and fasteners.	Written	Make a passing grade on a written and/or performance test.
11.2 Make drawings that show simplified, Schematic and detailed threads complete with notes and dimensions.	Problems as assigned by instructor.	To instructor's satisfaction.
11.3 Make drawings that show square head and hex head bolts and nuts assembled. Complete with notes, and dimensions.	Problems assigned by instructor.	To instructor's satisfaction.

EF-11/78

EGT 121

COURSE

GREENVILLE TECHNICAL COLLEGE

CONCEPT/PERFORMANCE	CONDITIONS	CRITERIA
12.0 Isometric Drawing		
12.1 Draw an isometric drawing of a cube.	Given cube size and instruction to use principles of isometric construction.	To instructor line quality and accuracy standards ansi lines and ±.01 accuracy to isometric form.
12.2 Draw ellipse in face of cube using template.	Given cube size and circle size.	"
12.3 Draw ellipse in each face of cube using approximate four-center ellipse method.	Given cube size and circle size.	"
12.4 Draw an isometric view of object that has inclined planes and angles.	Given object in 3-view, oblique or physically.	"
12.5 Draw an isometric of an object that has an irregular curved surface.	Given object, 3-view drawing or pictorial.	"
12.6 Draw and dimension completely an isometric view of an object having angles and circles.	Given object or pictorial of object.	"

EGT 121

COURSE

GREENVILLE TECHNICAL COLLEGE

CONCEPT/PERFORMANCE	CONDITIONS	CRITERIA
13.0 Oblique Drawing		
13.1 Draw an oblique view of a cube using oblique pictorial method.	Given size of cube and angle of sight, percent of depth protection and viewing direction (cabinet, cavalier, etc.)	Ansi line quality ±.01 accuracy to oblique form.
13.2 Draw oblique view of object having angles and inclined surfaces.	Given object, 3-view of object or pictorial of object.	"
13.3 Draw oblique view of object having circular planes or features.	"	"
14.0 Intersection and Developments		
14.1 Construct prisms and cylinders by parallel line development.	Assigned problems to be done on the drafting board using standard drafting techniques.	To the instructors' satisfaction
14.2 Construct pyramids and cones by radial line developments.	Assigned problems to be done on the drafting board using standard drafting techniques.	When cut out and folded or rolled they must form into the intended shape.
14.3 Construct transition pieces by triangulation.	Same as above.	Pieces must join together to form the intended shape when cut out, rolled, folded and stuck together.

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BGT 131

COURSE

GREENVILLE TECHNICAL COLLEGE

CONCEPT/PERFORMANCE	CONDITIONS	CRITERIA
15.0 Shop Processes		
15.1 Make working drawings of machine parts	Parts are to be machined from castings. Correct terminology must be shown in the notes and specifications.	To the instructors' satisfaction
15.2 Make working drawings of fabricated parts	Parts are to be shown assembled by welding.	To the instructors' satisfaction
15.3 Take a test on terminology relating to shop processes	Written test to cover terms, notes, machine tools, manufacturing processes, dimensioning, techniques and applications, etc.	85%

EGT 131

COURSE

GREENVILLE TECHNICAL COLLEGE

CONCEPT/PERFORMANCE	CONDITIONS	CRITERIA
16.0 Working Drawings		
16.1 Demonstrates an understanding of a detail part drawing	The student will prepare part drawings from problems assigned by the instructor.	Each drawing must include all information necessary to properly fabricate the parts to the satisfaction of the instructor.
16.2 Demonstrate an understanding of assembly drawings and the relationship that detail and assembly drawings have to each other.	Problems will be given in either of two formats: a) Exploded pictorial drawings with dimensions and materials noted b) Cross sectioned assembly layout drawings with design parameters defined.	The student must determine which part require detail part drawings, and the must prepare these drawings as noted above. He then must prepare all necessary sub-assembly and assembly drawings which will include a listing of parts in family-tree order.
16.3 Advanced student work: Demonstrate an understanding of the responsibilities of a layout draftsman.	The advanced students will be appointed as job leaders and will be assigned one or more detail draftsmen. The job captain will prepare a layout of a more complicated device from a problem assigned by the instructor. When the layout is complete, he will assign detail drawings to the draftsmen and supervise their work.	The layout will be completed to the satisfaction of the instructor, and will include a sequenced assembly procedure. The responsibility for handing in a complete drawing package will be on the job leader. (The job leader will check all detail and assembly drawings for completeness and correctness.

EE-10/75

INDUSTRIAL ELECRICITY ARTICULATION

Greenville Technical College GREENVILLE, SOUTH CAROLINA · 29606

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GREENVILLE TECHNICAL COLLEGE - ARTICULATION GRANT

INDUSTRIAL ELECTRICITY

MAY, 1976

OVERVIEW

The vocational school graduate will have the opportunity to exempt some of the Industrial Electricity courses at Greenville Technical College that are repetitious of his vocational school studies. The student may exempt a course after attaining an acceptable proficiency level on the appropriate placement test. Each placement test may be taken once a quarter with a limit of one retake during another quarter.

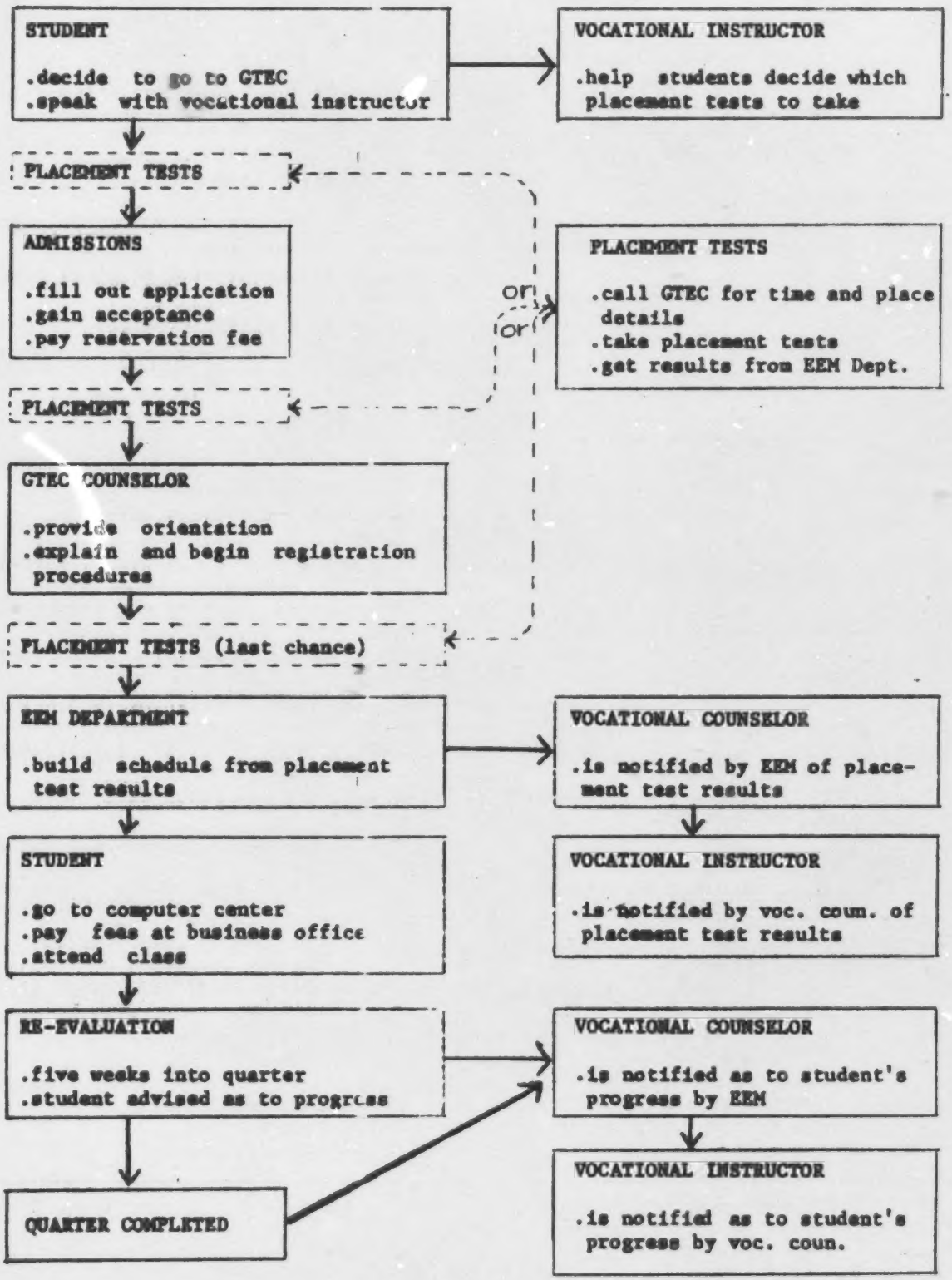
The course objectives that are covered in each placement test will be given to each vocational electricity instructor. They are also available for inspection at GTEC's Industrial Electricity department.

The first placement tests for exemptions will begin during the regular registration days just before fall quarter. They will continue to be offered during each pre-registration time in a testing center at Greenville Technical College. Mr. J.D. Warren, Industrial Division Chairman, or the Industrial Electricity department may be contacted for details.

Specifically, the following courses will be considered for exemption upon completion of the placement test:

Course Title	Course Number
Applied Electricity	EEM 101
Residential Electricity-Codes and Ordinances-A	EEM 345
Residential Electricity-Codes and Ordinances-B	EEM 346
DC Electricity	EEM 113
AC Electricity	EEM 123
AC Machines and Devices	EEM 127
Electrical Control Circuits	EEM 136
Electrical Math I	MAT 115
Electrical Math II	MAT 126

Proposed Flow Chart of Articulation Students - EEM



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PLACEMENT TESTS

Course objectives for each course offering a placement test are in this booklet and on file in the Industrial Electricity department at Greenville Technical College. Each vocational instructor may review these objectives and advise his students as to which placement tests would be most appropriate to take.

The placement tests will be offered at Greenville Technical College during the registration days immediately preceding each quarter. They will begin just before fall quarter, 1976, and be offered each quarter thereafter.

It is the student's responsibility to find out the location of the testing center and schedule him/herself so that all the desired placement tests may be taken in the time the center is open. The Industrial Electricity department and Mr. J.D. Warren, Industrial Division Chairman, may be called for details. It is planned that the guidance counselors at TEC will also know specific details.

Tentative schedules for registration (and therefore the placement tests) for the next year are as follows:

Fall, 1976 - Sept. 1,2,3 Winter, 1976 - Nov. 29,30

Spring, 1977 - March 1,2 Summer, 1977 - May 24,25

It is hoped that through the urging of the vocational instructors that each vocational student will take full advantage of these placement tests.

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INDUSTRIAL ELECTRICITY

ARTICULATION STUDENT'S PROGRESS

Your student, _____, from _____

Vocational Center has exempted the following courses:

EEM _____, MAT_____.

The student will be enrolling in the following EEM courses next quarter:_____ MAT course:_____.

This placement was based on

_____placement test score(s)

_____vocational instructor's recommendation

_____interview requested by _____and conducted by _____

The student

_____readily accepted placement

_____requested a lower placement, outcome _____

_____requested a higher placement, outcome _____

Date exemption(s) granted _____

* * * *

CONCEPT / PERFORMANCE	(Sometimes) Covered or Not Covered? SC, C, or NC When is it covered? 1-1, 1-2, 2-1, 2-2
Concept 1.0 Special Purpose Outlets	
1.1 Given a blueprint, recognize special-purpose outlet designations.	
1.2 Given nameplate reading, or specs, or equipment, calculate the load to be connected to a special outlet and use configuration chart for selection of outlet.	
1.3 Illustrate the proper grounding connections when using armored cable and nonmetallic-sheathed cable.	
1.4 Illustrate the proper connections to insure grounding continuity between a grounded outlet box and the grounding circuit of the receptacle.	
Concept 2.0 Special Purpose Outlets for a Water Pump and Heater	
2.1 List the basic requirements for a motor to be used on deep-well jet pump.	
2.2 Given the rating of a motor, calculate the conductor size and overcurrent protection required for the pump circuit.	
2.3 List the basic steps in various water heating methods which can be used.	
2.4 Describe the operation of the water heating system, including the functions of the tank, the heating elements, and the thermostats.	
2.5 Illustrate the proper grounding connections for the water heater.	
Concept 3.0 Special Purpose Outlets for Dryers and Over Garage Door Oponers	
3.1 Illustrate the proper wiring and grounding connections for large appliances based on the type of wiring method to be used.	
3.2 List the requirements for using service entrance cable to connect large appliances.	

CONCEPT / PERFORMANCE	(Sometimes) Covered or Not Covered SC, C, or NC When is it covered? 1-1, 1-2, 2-1, 2-2
3.3 Illustrate the proper connections involved in remote control switching such as in an overhead garage door opener based on manufacturer's installation recommendations.	
3.4 Given Code tables, select the proper overcurrent protective device based on the amperage rating of the device.	
Concept 4.0 Special Purpose Outlets for Kitchen Appliances	
4.1 Interpret electrical plans and construction blueprints to determine any special installation requirements for electrical appliances.	
4.2 Given NEC table 310/16-19 and notes and based on the ratings of appliances, select proper conductor sizes for wiring installation.	
4.3 Illustrate how to ground all appliances properly regardless of the wiring method used.	
4.4 Illustrate proper wiring of 7-heat control and 3-heat control for a dual element cooking unit-heating unit. (phasing out)	
4.5 List the advantages of infinite over 7- and 3-heat control.	
4.6 Illustrate the 3 options in the installation of various types of stove and oven units: group circuit, single circuit, and load center.	
Concept 5.0 Telephone, Television, and Signal Systems	
5.1 Describe the proper precautions to prevent line voltage interference with television signals.	
5.2 Given specifications, describe the installation of outlet boxes, outlets, and provide cable or conduit to which the telephone installer will make final connections.	
5.3 Define what is meant by signal circuit.	

CONCEPT/PERFORMANCE	(Sometimes) Covered or Not Covered? SC, C, or NC When is it covered? 1-1, 1-2, 2-1, 2-2
5.4 Describe the operation of a two-tone chime and a four-tone chime with one or more extension chimes.	
Concept 6.0 Heating Systems	
6.1 List the advantages of electric heat.	
6.2 Describe the several types of electric heating systems.	
6.3 Describe the variuos thermostat control systems for electric heating units.	
6.4 Describe the installation of electric heaters with appropriate tenperature controls according to NEC requirements.	
6.5 Interpret typical schematics provided by heating system control manufacturers.	
6.6 Describe the functions of the control devices provided in a typical system.	
6.7 Explain the principle of the thermopile and the thermocouple.	
6.8 Compare and contrast the electrical requirements for the following heating systems: oil, gas fire - water gravity, gas fire - self-contained.	
Concept 7.0 Service Entrances, Equipment, and Calculations	
7.1 Define these terms: electrical service, overhead service, service drop, and underground service.	
7.2 Describe the installation of a mast-type overhead service and an underground service.	
7.3 Discuss the NEC requirements for disconnecting the electrical service by means of a main panel and load centers.	

CONCEPT / PERFORMANCE	(Sometimes) Covered or Not Covered? C, SC, or NC When is it covered? 1-1, 1-2, 2-1, 2-2
7.4 Differentiate between the various types of fuses and select the proper fuse for a particular installation.	
7.5 Explain the operation of fuses and circuit breakers.	
7.6 Explain the t rm, "interrupting capacity".	
7.7 Determine available short-circuit current using a simple formula.	
7.8 Determine the total calculated load of a residence using the methods in Article 220 of the NEC.	
7.9 Calculate the size of the service entrance conductors, including the nuetral conductor.	
Concept 8.0 Remote Control Systems for Lighting Control Circuits	
8.1 Explain the operation of the various components of a low-voltage, remote control system for lighting circuits.	
8.2 Interpret the wiring diagrams of various types of low-voltage, remote control circuits.	
8.3 Describe the installation of a low-voltage, remote control system using the proper conductors, wiring, and components according to NEC requirements.	

EEM 136 - Electrical Control Circuits - Greenville Technical College

CONCEPT / PERFORMANCE	(Sometimes) Covered or Not Covered? C, SC, or NC When is it covered? 1-1, 1-2, 2-1, 2-2
Concept 1.0 Fundamentals of Controls	
1.1 Define and recognize the difference between manual, semi-automatic, and automatic controls.	
1.2 Label components of manual, semi-automatic, and automatic controls on provided diagrams.	
Concept 2.0 Control of Motor Starting	
2.1 Explain low-voltage (3 types) and line voltage starting.	
2.2 Explain 3 types of acceleration control: current limit, definite time, and voltage drop.	
2.3 Identify components for the controls of squirrel-cage, wound-rotor, synchronous and dc motors on provided wiring diagrams.	
2.4 State the purpose and give one example of each of eight types of motor protection.	
Concept 3.0 Control Components	
3.1 Identify and list the limitations of switches, breakers, contactors, and relays as motor starters.	
3.2 Given diagrams, explain the functions of the various components in different types of motor controls.	
Concept 4.0 Pilot Devices	
4.1 Explain how a pilot device functions and its location in a circuit.	
4.2 Identify seven or more pilot devices.	

CONCEPT / PERFORMANCE	(Sometimes) Covered or Not Covered? SC, C or NC When is it covered? 1-1, 1-2, 2-1, 2-2
Concept 5.0 Control Circuit Diagrams	
5.1 Identify and explain control diagram symbols.	
5.2 Identify and explain schematic, wiring, wireless, one-line, and block diagrams.	
Concept 6.0 Development of Control Circuits	
6.1 Compare and contrast two-wire and three-wire control.	
6.2 Given a control problem, develop a control circuit to handle the problem, draw a schematic for that circuit, transfer that information into a wiring diagram, then wire the circuit with provided components. (There will be 37 such control problems to complete during the remainder of the quarter.)	
Concept 7.0 Analysis of Control Circuits	
7.1 Given a control diagram, analyse the function and relationships of component parts. (Continue to develop control circuits.)	
Concept 8.0 Maintaining Control Circuits	
8.1 Discuss the value of proper and preventative maintainence of control equipment and how to avoid the most prevalent troubles. Continue to develop control circuits.	
Concept 9.0 Troubleshooting Control Circuits	
9.1 Given electrical circuits or diagrams, locate problem(s) and correct or propose a correction for the malfunction(s). Continue to develop control circuits.	

CONCEPT / PERFORMANCE	(Sometimes) COvered or Not Covered SC, C, or NC When is it covered? 1-1, 1-2, 2-1, 2-2
Concept 10.0 Basic Concepts of Static Control (This concept is not always covered.)	
10.1 Identify and state the function of basic logic circuit elements, and determine their appropriate function in given circuit diagrams.	

CONCEPT / PERFORMANCE	(Sometimes) Covered or Not Covered? C, SC, or NC When is it covered? 1-1, 1-2, 2-1, 2-2
Concept 1.0 - Current	
1.1 List the fundamental atomic particles and label the parts of a model of the atom.	
1.2 Explain the role of the electron in carrying electricity and contrast it to random drift of electrons.	
1.3 Define a coulomb and explain the behavior of charged bodies in terms of Coulomb's law	
1.4 Given a diagram, label a diagram of a complete (closed) circuit and a schematic diagram of a simple circuit containing a power source, a load, a switch, and conductor wires.	
1.5 Given a diagram, label the diagram of the direction of current flow in a circuit.	
1.6 List the components of an electric circuit and compare them with those of a simple hydraulic system.	
1.7 Define an ampere as a rate of coulombs of charge per second and calculate current fronthis.	
1.8 Write the common symbols for current, charge, and time, as distinguished from standard (SI) abbreviations for their units of measure.	
1.9 Calculate measurements in power of 10, express figures in scientific notation, and convert from one metric unit to another by means of powers of 10.	
1.10 List the steps for placing and connecting an ammeter into a circuit to measure current.	

EEM 113 - DC Electricity - Greenville Technical College

CONCEPT / PERFORMANCE	(Sometimes) Covered or Not Covered? C, SC, or NC When is it covered? 1-1, 1-2, 2-1, 2-2
2.0 - Voltage	
2.1 Compare and contrast definitions of emf and potential difference as separate forms of the same force.	
2.2 Define and calculate voltage.	
2.3 Define voltage rise and voltage drop, and identify the symbols used to differentiate them.	
2.4 Tell how dry cells produce emf.	
2.5 Explain the process of separating charges in a battery.	
2.6 Recognize a diagram of a series and parallel connection of cells, and calculate total voltage of each.	
2.7 Tell how an opposing voltage affects total output voltage.	
2.8 Given a voltmeter and components, connect a voltmeter to load and source of a circuit and make voltage measurements.	
Concept 3.0 - Resistance	
3.1 Define resistance, the parameters that vary it, and the effects of temperature upon it.	
3.2 Given resistivity and dimensions, calculate resistance.	
3.3 Identify the classes of resistors, circuit symbols that represent them, resistor ratings, and the [illegible] by which they are [illegible]nated.	
3.4 Given an ohmmeter and components, connect an ohmmeter in a circuit and make resistance measurements.	

CONCEPT / PERFORMANCE	(Sometimes) Covered or Not Covered? C, SC, or NC When is it covered? 1-1, 1-2, 2-1, 2-2
Concept 4.0 Measuring Voltage and Current in Series Circuits	
4.1 Define, compare, and contrast parallel and series circuits.	
4.2 State Kirchhoff's voltage law.	
4.3 Define the relation between voltage drop across a resistor and the ohmic value of its resistance.	
4.4 Given a multimeter and components, use a multimeter to measure voltage in a dc and ac circuit.	
Concept 5.0 - Relationships of Current, Voltage, and Resistance	
5.1 Tell how varying voltage or resistance in a series circuit effects current when the alternate element is held constant.	
5.2 Use Ohm's Law to calculate values and power expended in a series circuit.	
5.3 State, explain, and derive all equivalent equations for Ohm's law.	
5.4 List the effects of source internal resistance and how it can be determined.	
5.5 Define a short circuitand an open circuit, and locate each using an ohmmeter or voltmeter.	
Concept 6.0 - Parallel Circuits	
6.1 Define a parallel circuit.	
6.2 Define the relation of source voltage to parallel branches and source current to branch currents.	
6.3 State Kirchhoff's current law.	

CONCEPT / PERFORMANCE	(Sometimes) Covered or Not Covered? C, SC, or NC When is it covered? 1-1, 1-2, 2-1, 2-2
6.4 Given two of the following, current, resistance, or voltage, calculate source and branch currents, using Ohm's law.	
6.5 Calculate total circuit resistance.	
6.6 Reduce complex circuit schematics to simple form by redrawing.	
6.7 Given a multimeter and a problem circuit, use a multimeter to troubleshoot a given parallel circuits.	
6.8 Tell how a parallel circuit is fused.	
6.9 Use variational analysis as a tool in explaining how circuit quantities interact.	
Concept 7.0 Series - Parallel Circuits	
7.1 Find missing values and apply variational analysis to explain and compute values in a series-parallel circuit	
7.2 Define the concept of voltage reference.	
7.3 Define the terms ground and floating ground.	
7.4 Given voltage supply, design a voltage divider to give desired voltage.	
7.5 Practice complex circuit reduction by redrawing.	
Concept 8.0 Magnetism and Electromagnetics	
8.1 List the properties of a magnetic field.	
8.2 State the laws governing magnetic fields.	

CONCEPT / PERFORMANCE	(Sometimes) Covered or Not Covered? C, SC, or NC When is it covered? 1-1, 1-2, 2-1, 2-2
8.3 Define 3 types of magnetism.	
8.4 Identify types of magnetic materials.	
8.5 Tell how magnetic shielding works.	
8.6 State the magnetic domain theory.	
8.7 Distinguish between various types of magnets.	
8.8 State the relationship between electricity and magnetism.	
8.9 Label a diagram of the magnetic field around a current carrying loop and coil.	
8.10 Tell how a solenoid and a relay (mechanical and electrical) work.	
8.11 List the factors affecting flux density in an inductor.	
8.12 State and interpret Lenz's law.	
8.13 State the principles of electromagnetic induction.	
8.14 List the factors affecting generated emf.	
Concept 9.0 Mutual Induction and RL Circuits	
9.1 Define mutual induction, including the direction of the induced emf in a conductor.	
9.2 Name the units of inductance and state the rules for solving total inductance.	
9.3 Tell how mutual inductance takes place between two coils.	
9.4 Explain the behavior of an idealized RL circuit.	

CONCEPT / PERFORMANCE	(Sometimes) Covered or Not Covered? C, SC, or NC When is it covered? 1-1, 1-2, 2-1, 2-2
9.5 Plot: a) current rise, b) resistor voltage, c) coil voltage, d) decay of current, e) collapse of flux lines, f) decay of voltage in an RL circuit from opening of the switch (time T=0) until steady state.	
9.6 Define the RL constant.	
9.7 Make calculations of energizing and decaying RL circuits using the universal time-constant chart.	
Concept 10.0 Capacitance	
10.1 Describe the different kinds of capacitors and how they charge and discharge.	
10.2 Tell how a capacitor charges and discharges in an RC circuit.	
10.3 Define capacitance.	
10.4 Define the unit of capacitance in terms of farads and micro-farads.	
10.5 Calculate capacitance from type and size of dielectric.	
10.6 Calculate the value of total capacitance for capacitors in series, parallel, and series-parallel	
10.7 Define and calculate the RC time constant	
10.8 Solve RC time-constant problems, using the universal time-constant chart.	

CONCEPT / PERFORMANCE	(Sometimes) Covered or Not Covered? C, SC, or NC When is it covered? 1-1, 1-2, 2-1, 2-2
Concept 1.0 The Synchronous Motor and Electrodynamometer (Intro.)	
1.1 Explain how to connect a three-phase synchronous motor.	
1.2 Demonstrate how to connect the electrodynamometer.	
Concept 2.0 Split-Phase Induction Motor	
2.1 Explain or disassemble and reconstruct a split-phase motor.	
2.2 Measure the resistance of split-phase windings.	
2.3 Explain the basic motor wiring connections of a synchronous motor.	
2.4 Given an ampmeter, measure the starting and operating characteristics of the split-phase motor under load and no-load conditions.	
2.5 Calculate the power factor and efficiency of the split-phase motor.	
Concept 3.0 Capacitor Start and Run Motors	
3.1 Given an ampmeter, measure the starting and operating characteristics of the capacitor start motor.	
3.2 Compare the capacitor-start motor's starting and running performance with the split-phase motor's.	
3.3 Explain or disassemble and reassemble a capacitor run motor.	
3.4 Determine the capacitor-run motor running and starting characteristics.	
3.5 Compare the capacitor-run motor running and starting performance with the split-phase and capacitor start motors.	

CONCEPT / PERFORMANCE	(Sometimes) Covered or Not Covered? C, SC, or NC When is it covered? 1-1, 1-2, 2-1, 2-2
Concept 4.0 Universal Motor	
4.1 Explain or disassemble and reconstruct a universal motor.	
4.2 Given appropriate meters and equipment, determine a universal motor's no-load an full- load characteristics while on ac.	
4.3 Given appropriate meters and equipment, determine a universal motor's no-load and full-load characteristics while on dc.	
Concept 5.0 Repulsion-Start and Induction-Run Motors	
5.1 Explain or disassemble and reconstruct a repulsion start - induction run motor.	
5.2 State the properties of the repulsion start - induction run motor under no-load and full-load conditions.	
5.3 Explain the construction of the three-phase wound rotor induction motor.	
5.4 State the effect of the variation of the revolving field and rotor speed upon the voltage induced in the rotor of a wound rotor induction motor.	
Concept 6.0 Wound Rotor Induction	
6.1 Given appropriate meters and equipment, determine the starting characteristics of the wound rotor induction motor.	
6.2 Given an ampmeter, measure and record the rotor and stator currents at different motor speeds in a wound rotor induction motor.	

CONCEPT / PERFORMANCE	(Sometimes) Covered or Not Covered? C, SC, or NC When is it covered? 1-1, 1-2, 2-1, 2-2
Concept 7.0 Squirrel Cage Motor	
7.1 Explain or disassemble and reconstruct a three-phase squirrel cage motor.	
7.2 Given an ampmeter, determine the squirrel cage induction motor's no-load and full-load characteristics.	
Concept 8.0 The Synchronous Motor	
8.1 Explain or disassemble and reconstruct a three-phase synchronous motor.	
8.2 Demonstrate how a synchronous motor can act as a variable inductance or capacitance.	
8.3 Obtain the dc current versus ac current characteristics curve for the synchronous motor.	
8.4 Given an ampmeter and tachometer determine the full-load characteristics of the synchronous motor.	
8.5 Given a dynamometer, determine the pull-out torque of the synchronous motor.	

CONCEPT / PERFORMANCE	(Sometimes) Covered or Not Covered? C, SC, or NC When is it covered? 1-1, 1-2, 2-1, 2-2
Concept 1.0 Underwriters and Codes	
1.1 State the function and purpose of UL.	
1.2 State the function and purpose of NEC	
1.3 State the function and purpose of local electrical inspector and ordinances.	
Concept 2.0 Basic Principles and Measurements	
2.1 Use Ohm's Law to calculate values (amps, ohms, volts, watts) in a circuit.	
2.2 State and contrast definitions of conductance and resistance.	
Concept 3.0 AC and DC; Power Factor; Transformers	
3.1 Compare and contrast the generation, distribution, and usage of ac and dc.	
3.2 Explain power factor - cause and correction.	
3.3 Define alternation, cycle, hertz, phase, poly-phase, and frequency.	
3.4 Given all values except one, solve for each element of the power formula in ac and dc circuits.	
3.5 Explain how a transformer works and where it is used.	

CONCEPT / PERFORMANCE	(Sometimes) Covered or Not Covered? C, SC, or NC When is it covered? 1-1, 1-2, 2-1, 2-2
Concept 4.0 Basic Devices	
4.1 Recognize differences between incandescent and fluorescent lights.	
4.2 Recognize various wiring devices: switches, receptacles, and lighting outlets	
4.3 Recognize various types of fuses and circuit breakers.	
4.4 Explain the reason for, location of, and function of fuses and circuit breakers	
Concept 5.0 Circuits	
5.1 Define branch circuit and feeder	
5.2 Recognize series and parallel circuit diagrams	
Concept 6.0 Types and Sizes of Wires	
6.1 Explain how to determine wire sizes with an American wire gauge.	
6.2 Given load, ambiate temperature, overcurrent protection, or use requirements, match size and type of wire and insulation appropriate for usage	
Concept 7.0 Selection of Proper Wire Sizes	
7.1 Given current, distance, or wire size, calculate voltage drop and determine type and size of conductor to overcome the drop.	
Concept 8.0 Wire Connections and Joints	
8.1 Given the devices or pictures of the devices, recognize and select proper application of UL listed splicing and terminating devices	
8.2 Recall the restrictions on use of solder for service and grounding requirements.	

CONCEPT / PERFORMANCE	(Sometimes) Covered or Not Covered? C, SC, or NC When is it covered? 1-1, 1-2, 2-1, 2-2
Concept 9.0 Theory and Importance of Grounding	
9.1 State the purpose of grounding electrical equipment and systems and the consequences of the lack of good grounding.	
9.2 State possible materials used for grounding, their color, and their installation.	
9.3 Recognize proper and inferior basic grounding installations in light of NECode requirements.	
9.4 Differentiate between a ground fault and short circuit.	
9.5 State when G. F. C. I. (Ground fault circuit interrupter) should be used.	
Concept 10.0 Outlet and Switch Boxes	
10.1 Recognize and match usage of outlet boxes, junction boxes, and switch plates.	
10.2 Use NEC table 370-6A & B to determine size of boxes needed.	
Concept 11.0 Different Wiring Methods	
11.1 State the usage of non-metallic sheath cable and armored cable	
11.2 Given pictures or actual material, identify and list the advantages of and fittings used with the four basic types of conduit	
11.3 Given pictures or actual material, identify and list the advantages of and fittings used with the two basic types of flexible conduit.	

CONCEPT / PERFORMANCE	(Sometimes) Covered or Not Covered? C, SC, or NC When is it covered? 1-1, 1-2, 2-1, 2-2
Concept 12.0 Adequate Wiring	
12.1 Explain the difference between minimum-standard and adequate wiring and lighting.	
Concept 13.0 Service Entrance and Branch Circuits	
13.1 List the main considerations in choosing electrical service and equipment for residential occupancies.	
13.2 Explain the usage of the Code demand factor tables for determining size of service and service entrance conductors	
13.3 Define branch circuit and feeder	
Concept 14.0 Good Lighting	
14.1 Define lumen and footcandle	
14.2 Compare suitability of various types of lighting in different occupancies.	

EEM 345 - Residential Wiring (Part A) - Greenville Technical College

CONCEPT / PERFORMANCE	(Sometimes) Covered or Not Covered? C, SC, or NC When is it covered? 1-1, 1-2, 2-1, 2-2
Concept 1.0 General Information for Electrical Installations	
1.1 Explain the purpose of (electrical) blueprints	
1.2 Given a specific set of specifications, explain how specifications are used in estimating costs and making electrical installations.	
1.3 Explain why symbols and notations are used on electrical drawings.	
Concept 2.0 Electrical Symbols and Outlets	
2.1 Identify and explain the electrical outlet symbols used in the plans of the single family dwelling.	
2.2 Identify the types of outlets, boxes, fixtures, and switches used in the residence.	
2.3 Explain the methods of mounting the various electrical devices used in the residence.	
Concept 3.0 Determining the Number of Circuits Required	
3.1 Given the dimensions of a dwelling, Calculate the occupied floor area of a dwelling.	
3.2 Given floor area or dwelling's dimensions, determine the total load requirements in amperes for general lighting.	
3.3 Given floor area or dwelling's dimensions, determine the minimum number of lighting branch circuits required.	

CONCEPT / PERFORMANCE	(Sometimes) Covered or Not covered? C, SC, or NC When is it covered? 1-1, 1-2, 2-1, 2-2
3.4 Recall the number of small appliance circuits required in a residence.	
3.5 Given the NECode and the floor area or dwelling's dimensions, use the NECode (Article 210 & 220) to determine the basic requirements for the various branch circuits in a dwelling.	
Concept 4.0 Conductor Sizes and Types	
4.1 Define the terms used to size and rate conductors.	
4.2 Describe the types of cables used in the majority of residential installations.	
4.3 List the basic installation requirements for wiring cables.	
4.4 Describe the uses and installation requirements of electrical metallic tubing and rigid metal conduit.	
4.5 Describe the requirements for grounding a service entrance.	
Concept 5.0 Switch Control of Lighting Circuits	
5.1 Distinguish between the various types of toggle switches for lighting circuit control.	
5.2 Use Ohm's law to calculate circuit load and select a switch with the proper rating for the specific installation conditions.	
5.3 Describe the operation that each type of toggle switch performs in typical lighting circuit installations.	

CONCEPT / PERFORMANCE	(Sometimes) Covered or Not Covered? C, SC, or NC When is it covered? 1-1, 1-2, 2-1, 2-2
5.4 Demonstrate the correct wiring connections for each type of switch per Code requirements.	
Concept 6.0 Bedroom Lighting Branch Circuits	
6.1 Explain the difference in determing circuit wattage requirements in residential versus other occupancies.	
6.2 Given information from the residence plans, specifications, and Code requirements, draw a cable layout and a wiring diagram.	
6.3 Select the proper wall box for a particular installation.	
6.4 Explain how wall boxes can be grounded.	
6.5 List the requirements for the installation of fixtures in clothes closets.	
6.6 Explain the operation and connections of ground-fault circuit interrupters (GFCI).	
Concept 7.0 More Bedroom Lighting Branch Circuits	
7.1 Given a cable layout, draw a wiring diagram.	
7.2 Explain how outlets in one room can be connected to a circuit in another room.	
Concept 8.0 Bathroom and Passage Lighting Branch Circuits	
8.1 Connect recessed fixtures, both prewired and nonprewired types, according to Code regulations.	
8.2 Recall the separation regulations for installation of recessed fixtures.	

CONCEPT / PERFORMANCE	(Sometimes) Covered or Not Covered? C, SC, or NC When is it covered? 1-1, 1-2, 2-1, 2-2
8.3 List the equipment grounding requirements for bathroom installations.	
Concept 9.0 Lighting Branch Circuit for Halls and Front Entrances	
9.1 Install 3-wire circuits, making the proper connections to prevent overloads.	
9.2 Demonstrate the proper methods of installing pilot light switches in circuits.	
9.3 Explain how outdoor lighting can be installed using UF type underground cable.	
9.4 Describe two methods of bringing conduit into a residence from an external location.	
9.5 Define a wet location.	
Concept 10.0 Lighting Branch Circuits for Kitchen and Rear Entry and Small Appliance Circuits for Kitchens	
10.1 List three methods of installing under-cabinet lighting fixtures.	
10.2 Explain the use of exhaust fans for humidity control.	
10.3 Install split circuit (two-circuit) convenience receptacles.	
10.4 Discuss the general grounding considerations for a residence.	

CONCEPT / PERFORMANCE	(Sometimes) Covered or Not Covered? C, SC, or NC When is it covered? 1-1, 1-2, 2-1, 2-2
Concept 11.0 Lighting Branch Circuit for the Living Room	
11.1 Explain how to install multi-outlet assemblies.	
11.2 Determine load restrictions of multi-outlet assemblies as per NEC.	
11.3 Connect the proper dimmer controls for incandescent lamp circuits and for fluorescent lamp circuits.	
11.4 Define incandescent inrush current.	
11.5 Define a class P fluorescent ballast.	
Concept 12.0 Lighting Branch Circuit for the Dining Room, Porch, Garage Storage Area, and Attic	
12.1 Install a three-way switch and a dimmer control.	
12.2 Restate the Code requirements for the installation of outlets and receptacles in damp or wet locations.	
12.3 Describe the installation of attic wiring according to Code requirements.	
Concept 13.0 Lighting Branch Circuit for the Garage	
13.1 Given conditions in the cable layout and/or blueprints, select the proper wiring method (cable or conduit) based on the conditions of installation.	
Concept 14.0 Lighting and Receptacle Branch Circuits for the Terrace, Recreation Room, and Utility Room	
14.1 Select the proper size boxes for installation in areas where the construction makes it impossible to install deep boxes.	

CONCEPT / PERFORMANCE	(Sometimes)Covered or Not Covered C, SC, or NC When is it covered? 1-1, 1-2, 2-1, 2-2
14.2 Describe the installation steps of conduit in concrete floors and on cinder block walls.	
14.3 List the basic requirements for the proper installation of conduit in an exposed location.	
14.4 Explain which convenience receptacles should be connected to separate circuits.	
Concept 15.0 Lighting and Convenience Receptacle Branch Circuits for the Bathroom, Workshop, and Storage Room	
15.1 Select the proper wiring method and outlet boxes for exposed wiring.	
15.2 Select the proper outlet box for surface mounting in a basement area.	
15.3 Given Code tables 310/16-19 and notes or ampacity, wattages, or load requirements for the load involved, determine the appropriate wire size for a specific ampacity and apply derating factors if necessary.	

EEM 123- AC Electricity - Greenville Technical College

CONCEPT / PERFORMANCE	(Sometimes) Covered or Not Covered? C, SC, or NC When is it covered? 1-1, 1-2, 2-1, 2-2
Concept 1.0 - Generating AC Voltage, AC and DC Generators	
1.1 Tell how ac voltage is generated.	
1.2 Define the terms that describe an ac wave: aplitude, frequency, and phase relationship.	
1.3 Given a diagram, label the parts of an ac generator	
1.4 State the function of slip rings.	
1.5 State the function of a commutator.	
Concept 2.0 - AC Relationships	
2.1 State how a coil reacts to ac.	
2.2 Define and state the factors affecting inductive reactance.	
2.3 Given circuit perameters, calculate inductive reactance and current in an inductive circuit.	
2.4 Define a vector.	
2.5 Given magnitude and direction, calculate the sum of two vectors and plot rotating vector sine wave.	
2.6 Define the phase relationship between current and voltage in an inductive and capacitive ac circuit.	
2.7 Define and state the factors affecting capacitive reactance.	
2.8 Given circuit perameters, calculate capacitive reactance.	
2.9 Add ac voltages vectorially.	
2.10 Define and calculate impedance.	

CONCEPT / PERFORMANCE	(Sometimes) Covered or Not Covered? C, SC, or NC When is it covered? 1-1, 1-2, 2-1, 2-2
2.11 Define, real, apparent, and reactive power.	
2.12 Define and compute the power factor.	
Concept 3.0 The Transformer	
3.1 State and explain the function and construction of a transformer.	
3.2 Given a schematic of a transformer with multiple secondary windings, determine the stepdown ratios required for circuit voltages and loads.	
3.3 Draw the schematic symbols for the various kinds of transformers.	
3.4 Determine the direction of induced voltage in the secondary conditions.	
3.5 Define current and voltage relationships.	
3.6 Calculate power in a transformer.	
3.7 Define copper, eddy current, and hysteresis loss.	
3.8 State transformer efficiency.	
3.9 Name transformer ratings.	
3.10 Define transformer impedence relationships.	
3.11 Given typical circuit values, solve impedence matching problems for a transformer.	
3.12 Define the function of an auto transformer.	

CONCEPT / PERFORMANCE	(Sometimes) Covered or Not Covered? C, SC, or NC When is it covered? 1-1, 1-2, 2-1, 2-2
Concept 4.0 Power Supplies	
4.1 State the functions of a power supply.	
4.2 Define the functions of a rectifier.	
4.3 Diagram a full and half-wave rectifier.	
4.4 Explain the rectification of ac input utilizing diode rectification.	
4.5 Define ripple frequency and its relationship to half and full-wave rectification.	
4.6 Diagram a 1) choke-input filter, 2) capacitor-input filter, and 3) pi filter and explain the relative advantages and disadvantages of each.	
Concept 5.0 AC Computations	
5.1 Define the trigonometric functions of sine, cosine, and tangent.	
5.2 Solve vectors by graphical analysis.	
5.3 Solve vectors by the Pythagorean Theorem.	
5.4 Solve circuit problems by trigonometry.	
5.5 Define rectangular coordinates.	
5.6 Define polar coordinates.	
5.7 Make impedence calculation using rectangular and polar coordinates.	
Concept 6.0 Series Resistive - Reactive Circuits	
6.1 Analyze a series RL circuit by varying frequency, resistance, applied voltage and inductance; prove the effects by mathematical calculations.	

CONCEPT / PERFORMANCE	(Sometimes) Covered or Not Covered? C, SC, or NC When is it covered? 1-1, 1-2, 2-1, 2-2
6.2 Define the terms cut-off and half-power point	
6.3 Determine the cutoff frequency of an RL circuit.	
6.4 Define an RL low-pass and high-pass filter.	
6.5 Solve vector diagrams for series RC circuits.	
6.6 Analyze a series RC circuit by variational analysis; prove the effects by mathematical calculations.	
6.7 Determine the effects pf frequency on RC circuits.	
6.8 Define an RC low-pass and high-pass filter.	
6.9 Solve mathematically for impedence in a series RLC circuit.	
6.10 Define the figure of merit (Q) for a coil and determine its value mathematically.	
6.11 Define skin effect.	
6.12 Define proximity effect.	
Concept 7.0 Series Resonance	
7.1 Define the conditions for series resonance	
7.2 Derive the expression for the resonant frequency.	
7.3 Explain and calculate voltage gain across the reactive elements in resonance.	
7.4 Diagram current and impedence curves at the resonant frequency.	

CONCEPT / PERFORMANCE	(Sometimes) Covered or Not Covered? C, SC, or NC When is it covered? 1-1, 1-?, 2-1, 2-2
7.5 Define bandwidth and contrast it with voltage gain and explain their use in amplifiers and receivers.	
7.6 Explain the effects of Q on bandwidth.	
7.7 Tell how many series resonant circuits may be employed as filters.	
Concept 8.0 Parallel-Reactive Circuits	
8.1 Explain the current and voltage relationships of series versus parallel circuits.	
8.2 Calculate current, impedence, power, and power factor in a parallel RL circuit.	
8.3 Analyze a parallel RL circuit by varying frequency, resistance, applied voltage, and inductance; prove the effects by mathematical calculations.	
8.4 Calculate current, impedence, power, and power factor in a parallel RC circuit.	
8.5 Calculate current, impedence, power, and power factor in an RLC circuit.	
8.6 Analyze an ideal parallel LC circuit.	
8.7 Define the conditions for parallel resonance.	
8.8 Diagram current and impedence curves at the resonant frequency.	
8.9 Define a tank circuit.	
8.10 Analyze a practical tank circuit.	
8.11 Analyze circuit behavior above and below the resonant frequency.	

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CONCEPT / PERFORMANCE	(Sometimes) Covered or Not Covered? C, SC, or NC When is it covered? 1-1, 1-2, 2-1, 2-2
8.12 Tell how parallel resonant circuits may be used as filters.	
8.13 Define when the effective resistance of the coil in an RL circuit must be considered.	
8.14 Calculate figure of merit, impedence, and current in a practical RL circuit.	

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